IMPROVEMENT OF SMALL CITY THROUGHROADS

Finnish National Road Administration
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PREFACE

The typical characteristics of a Finnish rural built-up area (the abbreviation BUA is often used in this guide for convenience) include: the population is from a few hundred to about 10,000; the landscape structure of the area and the location of the BUA in relation to the landscape are still visible; the historical layers can be seen even now, although the larger scale of more recent construction dominates; the functional structure is still mixed.

The thoroughfares of most Finnish built-up areas were furnished with bike and pedestrian traffic routes, at first often only sidewalks, in the 1960s and '70s. Typical features of a BUA at that time included extensive paved areas, wide roads, narrow sidewalks and poor safety for bike and pedestrian traffic.

A design directive for BUA thoroughfares, here called 'throughroads', was completed in 1984. The purpose of this directive was to guide planners toward designs that would

- take the existing environment into account and improve its quality and pleasantness;
- clarify traffic arrangements particularly in centers, thus enhancing traffic safety;
- improve the level of service and thus the status of bike and pedestrian traffic.

Throughroads constructed according to the directive mentioned above were examined in a survey entitled 'Throughroads built in the 1980s; villagescape and functionality survey', completed in 1992.

Throughroads have certainly improved, but not all the goals have been met. The greatest need for development is in the environment. In most cases, the villagescape has not been taken into account, making the immediate surroundings of the road integral to the road itself rather than part of the BUA structure. Thus, the road is too separate from its environment. One of the greatest shortcomings is the incompatibility of the vertical alignment with the surrounding buildings and terrain.

Accident levels have fallen in the places surveyed, but they are still fairly high. Average travel speeds are close to the speed limit, and the speed limit is frequently greatly exceeded. Speed constraints have not been used as design features. The traveled ways are unnecessarily wide and the intersections too extensive. Crossing a throughroad is dangerous for pedestrians even after road modification.

The purpose of this guide is to develop throughroad design with special reference to the following points:

* improving the safety of bike and pedestrian traffic;
* fitting motor traffic into the BUA, and moderating traffic speeds;
* supporting the BUA structure with road design;
* taking the villagescape into account;
* taking all community cost impacts into account when reviewing ventures.

The guide deals with the development of downtown roads in rural BUAs (population 10,000 or less). The purpose of the survey is to provide ideas on alternatives in the process of designing throughroads.

The guide was prepared to a commission from the road design department of the National Road Administration (FinnRA). The project was supervised by Saara Toivonen and a managing group consisting of Ulla Priha, Raija Merivirta, Aulis Nironen and Pauli Velhonoja of FinnRA, Aira Korhonen of the Vaasa road district, Matti Höyssä of the Häme road district and Ahti Kekkonen of the Finnish Municipal Association.

Architects Jukka Turtiainen (Jukka Turtiainen architects' office), and Hannu Haapa, and engineer Seppo Karppinen (Viatek-Vessu, from January 1, 1993 Esisuunnittelijat Oy) have acted as consultants.

SUMMARY

The purpose of this guide is to improve the design of downtown roads in rural built-up areas (BUAs) with a population of 10,000 or less, with special reference to traffic safety and villagescape.

The material collected for this guide includes interviews with BUA and traffic design experts and interest groups, a seminar organized for experts and interest groups, and field trips to about 70 throughroad locations all over Finland. The design principles and models developed were tested by applying them to plans intended for execution over the next few years.

The boom in rural BUA development began in the 1960s. At that time, the economic structure changed and services began to gravitate from rural to built-up areas. The demands made by increasing use of automobiles were taken into account in road design and zoning to a greater extent than before. The building of bypasses and thoroughfares sparked a structural change in BUAs, as the result of which the centers of many had shifted by the 1990s, some more than once.

The parking lots needed for the increasing volumes of car traffic were built in front of stores in shopping areas. Old buildings were torn down, and downtown roads were expanded into wide paved areas. In the 1980s, zoning in BUAs and downtown road modifications aimed at improving traffic safety and enhancing the villagescape. On the other hand, the economic boom period of the 1980s spurred the zoning of business buildings close to intersections with main roads, creating new problems for traffic and community structure design.

The major traffic problem on throughroads in BUAs is the lack of traffic safety. About 6% of public roads are throughroads, broadly speaking. Throughroads carry about 17% of the overall kilometerage but have 27% of all personal injury or fatality accidents (PIF accidents). No less than 47% of bike and pedestrian traffic PIF accidents occur on throughroads. Over half of the PIF accidents on thoroughfares in BUA centers involve bike and pedestrian traffic.

The main development principles for traffic and land-use design outlined in this guide are:

* Major investments in built-up areas, such as downtown road modification, must always be backed up by a clear overall plan of the BUA structure and road network development. Now that resources are scarce, the major priority is to complement the community structure and to maintain and improve existing structures.
* A good result requires cooperation and collaboration between the zoner, the environment designer and the road designer, as well as an open planning process in which landowners, inhabitants and road users can participate. These parties should search for common ground in values or at least acknowledge the significance of conflicting values.
* Before any design outlines are proposed, the parties involved in the planning process must establish a consensus about problems requiring solution, environmental and traffic goals and the terms imposed by the environment.
* Improving the status and safety of bike and pedestrian traffic, based on the links and movement facilities needed by the various groups, is of major importance.
* To improve traffic safety, the speed limit on downtown roads must be brought down to 30 or 40 kph.
* Throughroads should be developed as a common space to be used by all the residents of the community, thus also catering to the social needs of various user groups.
* Throughroad projects should take into account not only construction, maintenance and traffic costs but also any costs involved in changes in the community structure.
* Throughroad design should aim at preserving or rediscovering the small scale, sensitivity and richness of detail of the road and its environment. A small scale should be preserved in the

horizontal and vertical alignment, since these are essential for the villagescape and for travel speeds. Fitting of the vertical alignment into the terrain and the surrounding buildings requires the utmost care. All existing buildings and trees should be preserved.

* Spatially limited road sections should be kept as they are. Wide open thoroughfares can be sub-divided using gateway structures.
* Road surfacing materials, light fixtures, street furniture and other details should conform to the basic design and character of the area concerned.

An analysis of the present situation is carried out, to be used as the basis of throughroad design. The analysis of the present situation consists of a study of the following:

* the functional structure of and land use in the built-up area;
* the villagescape;
* the road network;
* the traffic.

Throughroads can be categorized on the basis of this analysis to make it easier to establish the development goals for each road section and to find design concepts that resolve traffic problems and fit in with the environment.

The following principles should be observed in downtown road and traffic design:

* The main starting point is a low travel speed. This must be taken into account in the technical specifications of the road and the road environment. The environment must be carefully considered and should contain details based on local conditions.
* Designing a throughroad means designing a space, the central factors being delimitation of the street space, area boundaries, nodes and landmarks. The space is created by an interaction between land use and road design. Land-use design also gives control over future functions in the built-up area.
* Planners and road designers must always cooperate when designing improvements in the villagescape and the road environment.
* Standard cross-sections should not be used in design.
* The traveled way cross-section should be based on low travel speeds, making 6.0 to 6.5 m a suitable width for the traveled way. Traffic volume does not affect this traveled way width.
* If required, roads can be narrowed, allowing only single-lane traffic.
* The minimum values of elements based on travel dynamics should not be used when designing the alignment of the road.
* The safety of bike and pedestrian traffic crossing the road should be improved with structural features such as traffic islands or elevated crosswalks.
* The safety of bike and pedestrian traffic along the road (parallel traffic) should be improved by minimizing crossings between parking traffic and bike and pedestrian traffic.
* Curbside parking is possible.
* Intersections should be designed for low travel speeds.
* Intersection channeling is rarely required. If channeling is designed, it should be designed for low travel speeds. Channeling can also act as a constraint.
* Bus stops can be built without bays, in which case they act as constraints.
* Constraints should be used as necessary to keep travel speeds down and to help observe the speed limit. The constraints should be designed as a feasible component in the traffic design and the road environment. Constraints should be located about 100 m apart to keep travel speeds at the desired level.

These design principles are illustrated with outline plans drawn up for six case studies.

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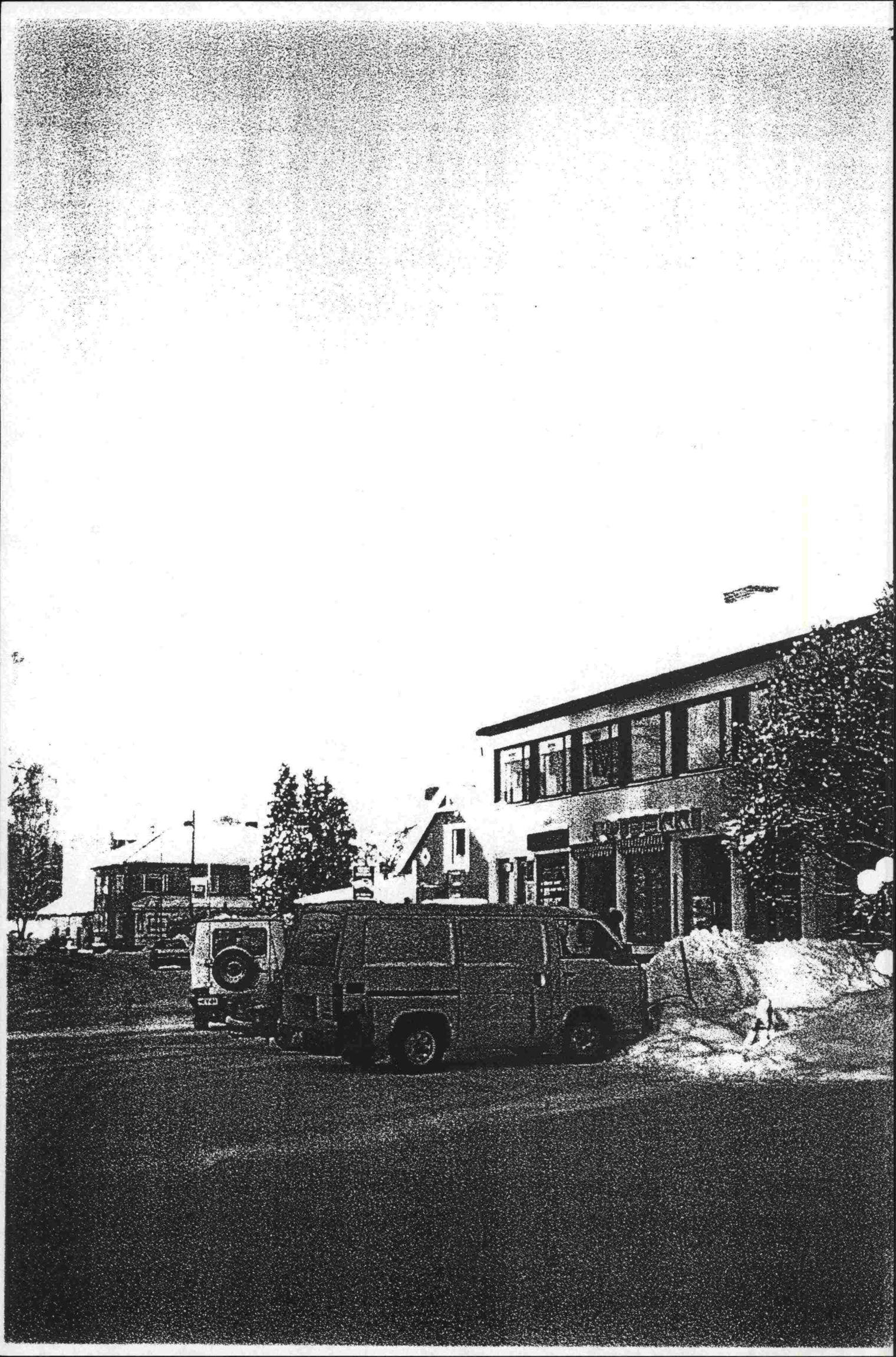


1 MANNER OF PREPARATION

At the initial stage of the project, several BUA and traffic design experts and interest groups were interviewed. The purpose of these interviews was to chart present problems relating to design methods, concepts and execution. The goals and principles of good design were also discussed. The interviewees also gave information on suitable case studies.

The target groups for the expert interviews were:

- Ministry of the Environment
- Ministry of Transport and Communications
- Central Organization for Traffic Safety (Liikenneturva)
- Central Chamber of Commerce
- Wholesalers
- Finnish Road Haulage Association
- Enemmistö ry
- City of Helsinki
- Regional architects
- Designers, builders and maintenance staff of the Finnish National Road Administration (FinnRA)
- Traffic and environment psychologists
- Provincial governments
- Regional planning associations
- National Board of Antiquities
- Finnish Municipal Association

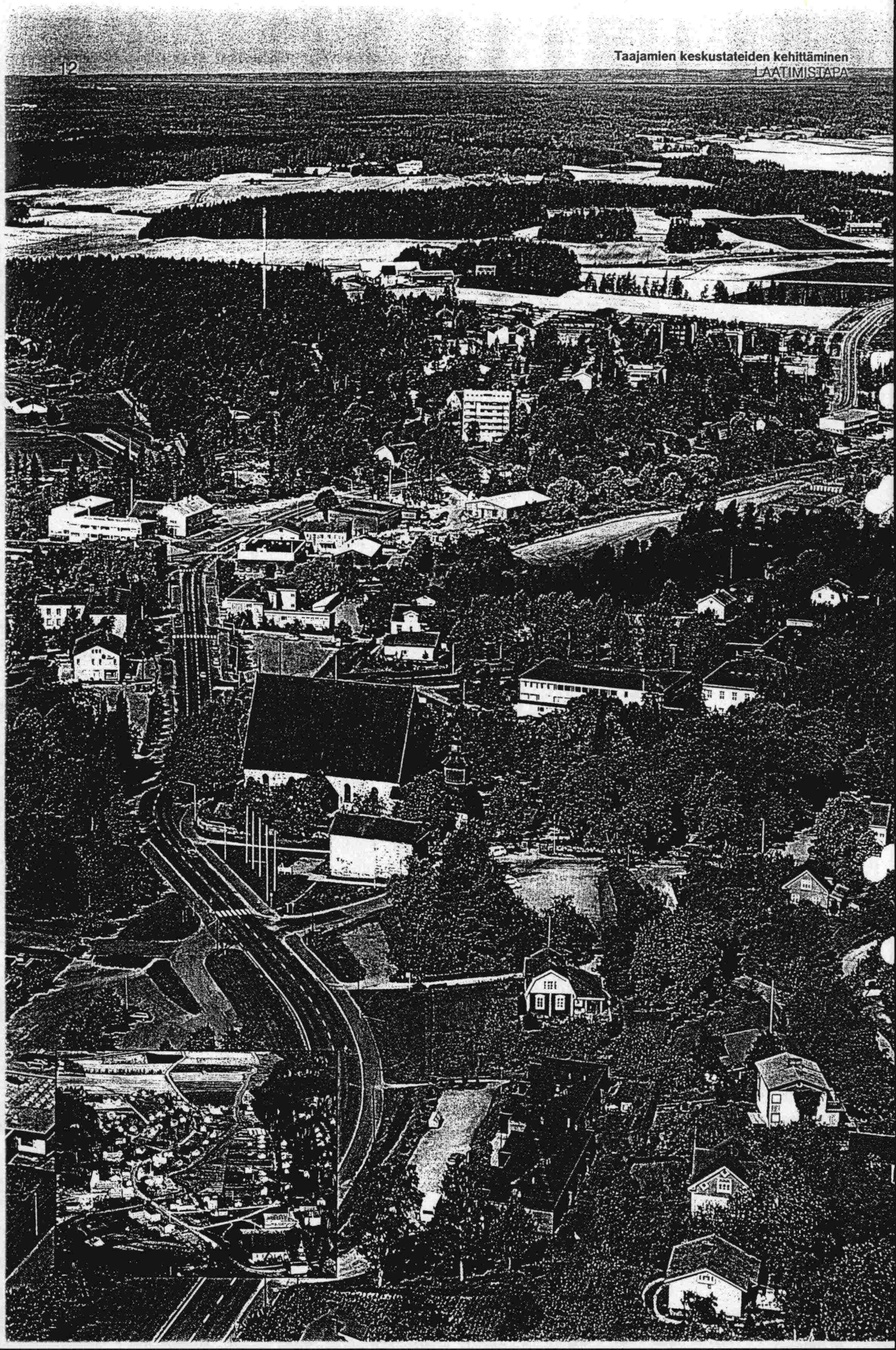
Another important body of material was acquired from field trips to about 70 throughroads around Finland. In some cases the roads had been built in the 1980s, in others they were being planned for the immediate future. By examining the present state of throughroads, ideas were formed as to which aspects still need development.

New design principles and concepts were tested by applying them to projects scheduled for the next few years; such projects included the built-up areas of Rantasalmi, Jaala, Vihanti, Sumiainen, Kuhmo and Kerimäki.

The preliminary design concepts and models were discussed at a seminar with an extensive panel of experts on September 17, 1992. Participants in addition to those listed above were

- Invalid Foundation
- Posts and Telecommunications of Finland
- Suomi Touring Club
- Finnish Taxi Association
- Home District Association
- Association of Finnish Provinces
- Association of Finland's Swedish-speaking Municipalities
- Municipality of Vihanti

The results of the seminar confirmed that the new goals and concepts were a step in the right direction.



2 THE HISTORY OF RURAL BUILT-UP AREAS AND THROUGHROADS

2.1 The history of rural built-up areas

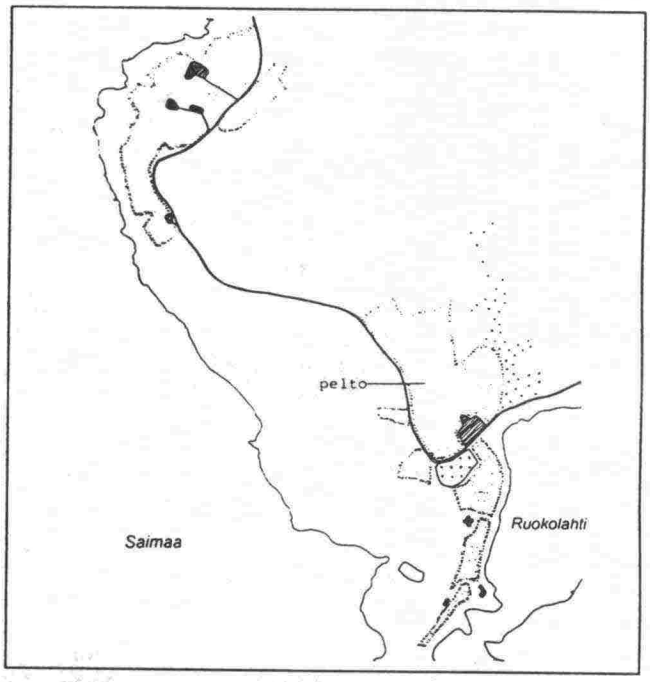
The birth of the rural BUA

The rural built-up area, or 'church village' in Finnish, is a fairly recent phenomenon, having only been in existence for a century or so.

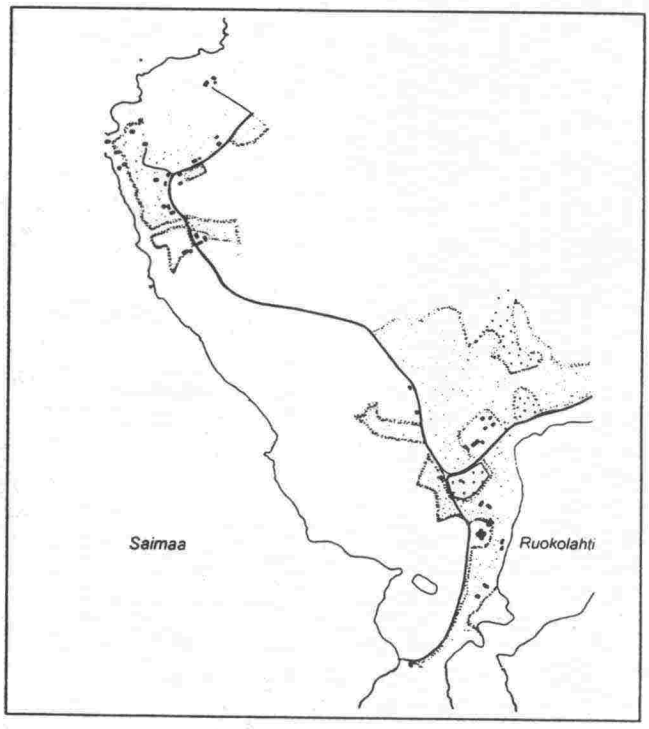
Before the land reform begun in the 1850s, rural villages were the major BUAs in the countryside, often being larger than cities in those days. The rationalization of agriculture combined with land reform to splinter these original rural centers in the last two decades of the 19th century. The 'church villages', the municipal centers of today, began to develop in the latter half of the previous century around the parish church and municipal offices. Important legislative events contributing to this development were the 1865 Municipal Decree distinguishing the municipality from the parish and the 1859 Senate decision to permit the establishment of country stores; furthermore, the rapid expansion of the wood processing industry in the 1870s brought wealth to rural areas through farmers who owned forest land.

In the late 19th century, the few farmhouses and homes of the landless clustered around the church and municipal offices were joined by stores, a school, perhaps a dairy and often a small sawmill. These buildings were of a new type and so was their architecture, although the stores followed the traditional farmhouse design well into this century. Rural built-up areas grew slowly and organically into well-defined environmental units.

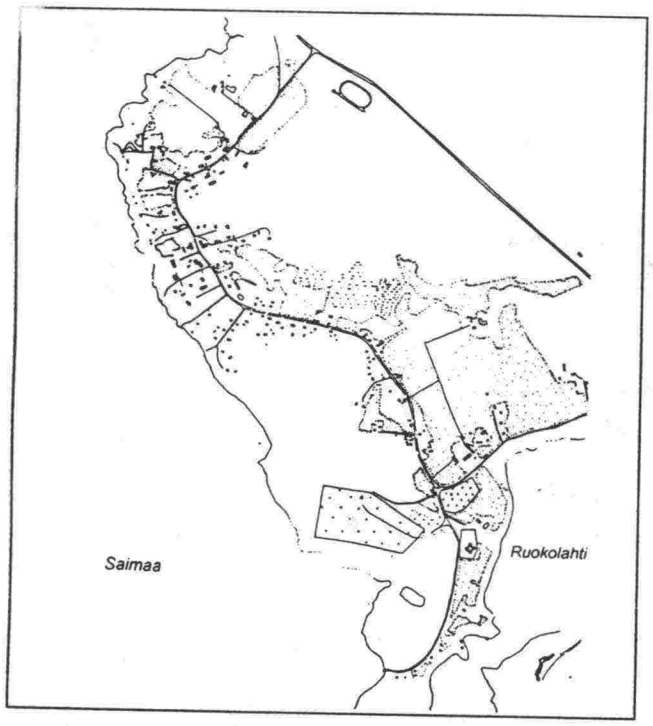
Features they had in common were: they were located in a scenically significant spot, usually by a watercourse or on a ridge; they were built around a central thoroughfare or 'highroad' (*raitti* in Finnish); the farmland lay immediately adjoining the village; and the traditional wood architecture gave the building stock a uniform appearance and a human scale. These rural



2/1. Ruokolahti in 1852. The church village lies on flatland between Lake Saimaa and a ridge. At this stage, the village consists of no more than a few farmhouses, their fields and the church.



2/2. Ruokolahti in 1898. The village proper has grown up about 1 km north of the church, along the road. Houses and fields have also appeared closer to the church.



2/3. Ruokolahti in 1960. The population has increased considerably in the first half of this century. However, new construction still adheres mainly to the village highroad. A new highway has been built to the north of the village.

2/4. Ruokolahti in 1978. Larger buildings have appeared in the villagescape (row houses and apartment houses). New construction is no longer tied to the central road, and the village is being split into areas. The road network has been altered, and the highway intersections have begun to attract new construction.

centers preserved their character nearly intact until World War II.

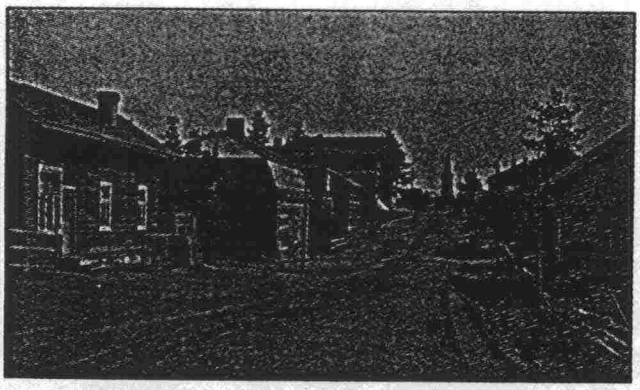
Housing programs and economic recovery after the war began to introduce new features to rural BUAs in the 1950s: new, separate low-rise housing areas were planted close to the old village highroad. New business buildings, schools and new municipal offices were built in many centers. These new buildings, as a rule, fitted in well with the existing villagescape. The zoning of rural BUAs, a State responsibility until 1958, was of great importance for later developments.

The changing character of the rural BUA

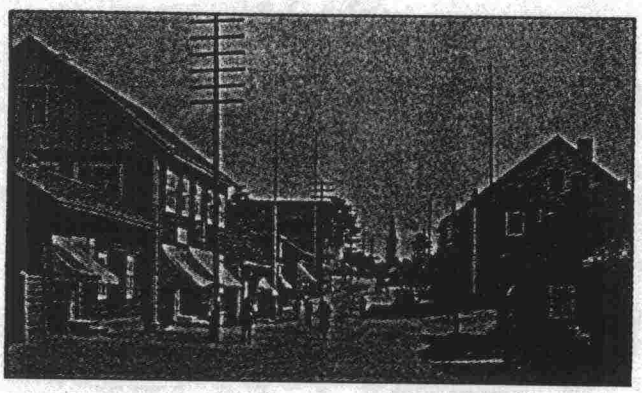
The boom in rural BUA development began in the 1960s. The livelihood structure changed and the focus began to shift from rural areas to urban centers, where production and services could be better developed. Municipal administrations also considered it important to create a strong municipal center by raising the standard of services and creating jobs. A strong center was considered to help stem the population depletion of rural areas. The character of rural centers changed in the 1960s and '70s; in many cases they gained greater independence, as is shown by the growth in the proportion of jobs unrelated to agriculture and by the urbanization of housing and lifestyles.

During the agrarian society, most of the rural population lived in rural areas and villages. The role of the municipal center was to act as a service focus. The structural change that washed over the countryside and its built-up areas also redirected the latter's growth and development. For some, development stopped or declined, while others began a period of rapid growth. Growing municipalities often emphasized their urban character by becoming cities, administratively speaking.

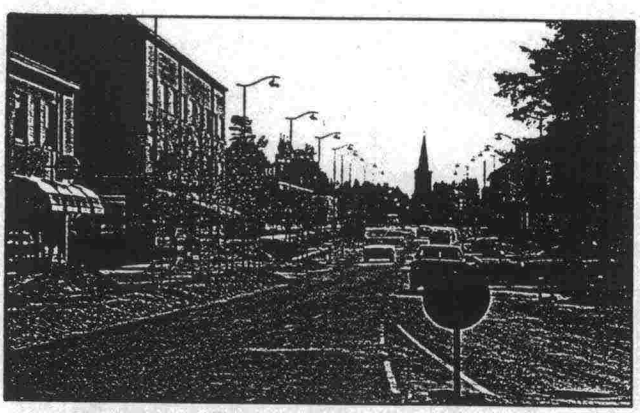
From the 1960s onwards, the growth process acquired distinct urban characteristics. The pattern of growth closely adjoining the existing center structure changed, as the result of zoning and land-use policy, to a layout based on functional differentiation.



2/5. The highroad of Sotkamo church village in the early 1920s. Low log buildings line the quiet road. The church steeple forms the end-point of the road.



2/6. The highroad of Sotkamo church village in the late 1930s. The view has become much more lively. Cars have appeared, as have store signs and awnings. There are more buildings closer together along the road.



2/7. The highroad of Sotkamo church village in the early 1990s. The street space has been widened with the addition of sidewalks segregated from the road by trees and of traffic islands. No old buildings have been preserved, but the solid new buildings define the street space well, and the church steeple still standing at the end of the road brings a sense of historical continuity to the village.

This was most apparent in the creation of suburban housing areas and separate industrial estates. Small industrial estates and municipal industrial halls were projects that the State supported and subsidized as a part of the development of the countryside.

Housing was needed for workers and their families who had moved in from rural areas. As pensioners also began to migrate from rural areas to the municipal center to be closer to the services, the demand for small apartments grew. Blocks of row houses and apartment houses were built.

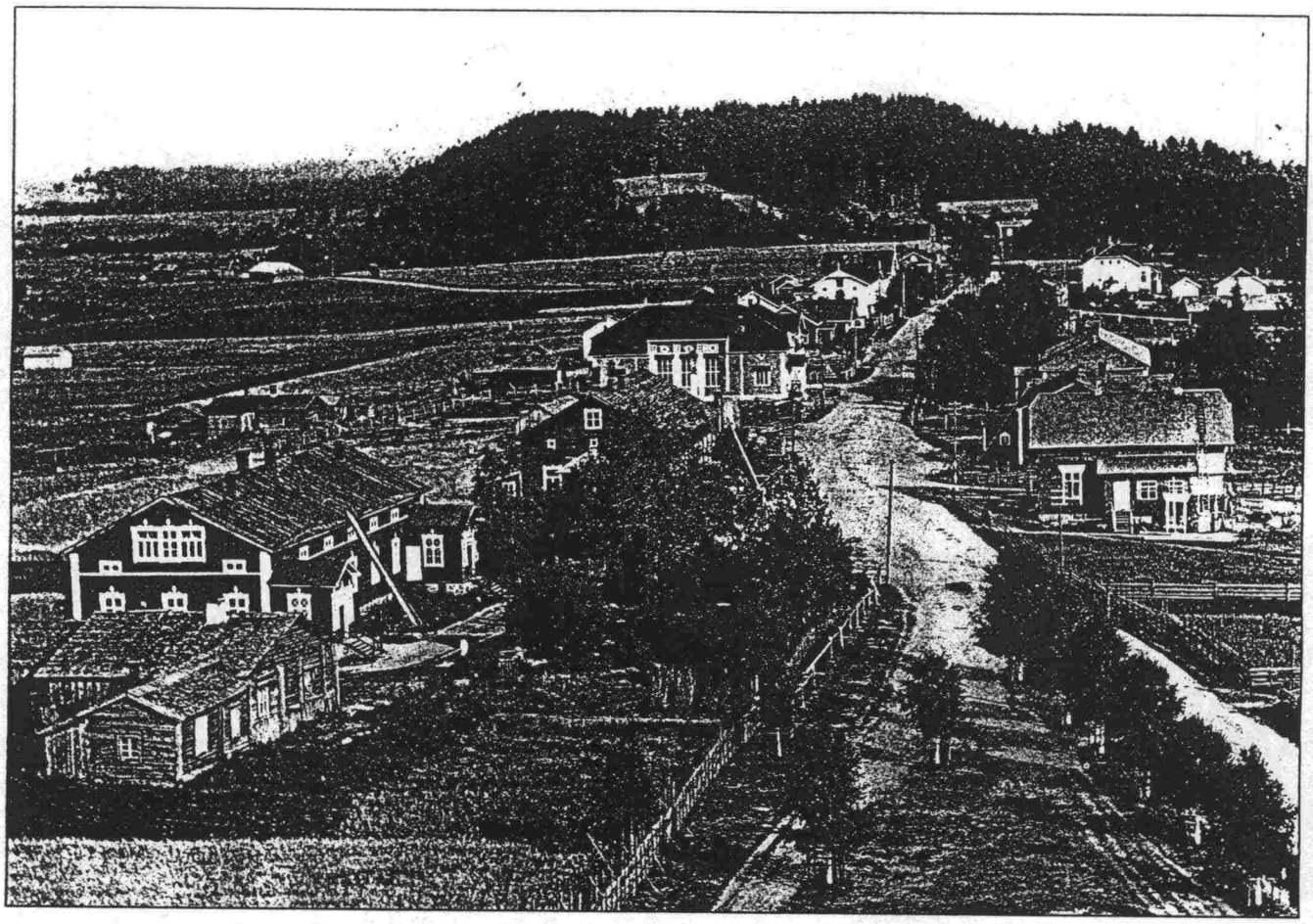
Change in the environment

Traditionally, church villages grew up around a village 'highroad' and harmonized well with the surrounding landscape. The change from a linear to a modular structure in the 1960s began to blur the relationship between the community and its surrounding landscape. Instead of traditional building sites, houses were placed in less advantageous locations such as open fields and bogs. Functionally uniform housing areas and industrial estates became the dominant environment type.

The diversity of the business center also began to suffer as the number of people living there dropped and small industries moved to new areas, often more conveniently located for the main roads. Extensive construction in public services (schools, health centers, sports institutions, fire stations, etc.) continued from the 1950s to the late 1980s. In many cases, the services were scattered all over the area.

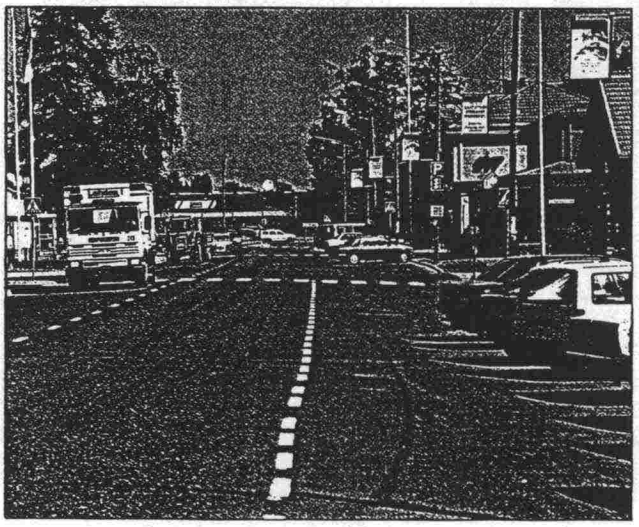
In business construction, the single-story hall-type store began to replace the turn-of-the-century model (stores downstairs, living accommodation upstairs) in the 1960s. This trend was supported through zoning. As a result, even small centers may have shopping complexes containing exclusively commercial services, although as a rule these are not very large.

Shopping practices began to change dramatically in the 1960s as cars became more common and the self-service store concept



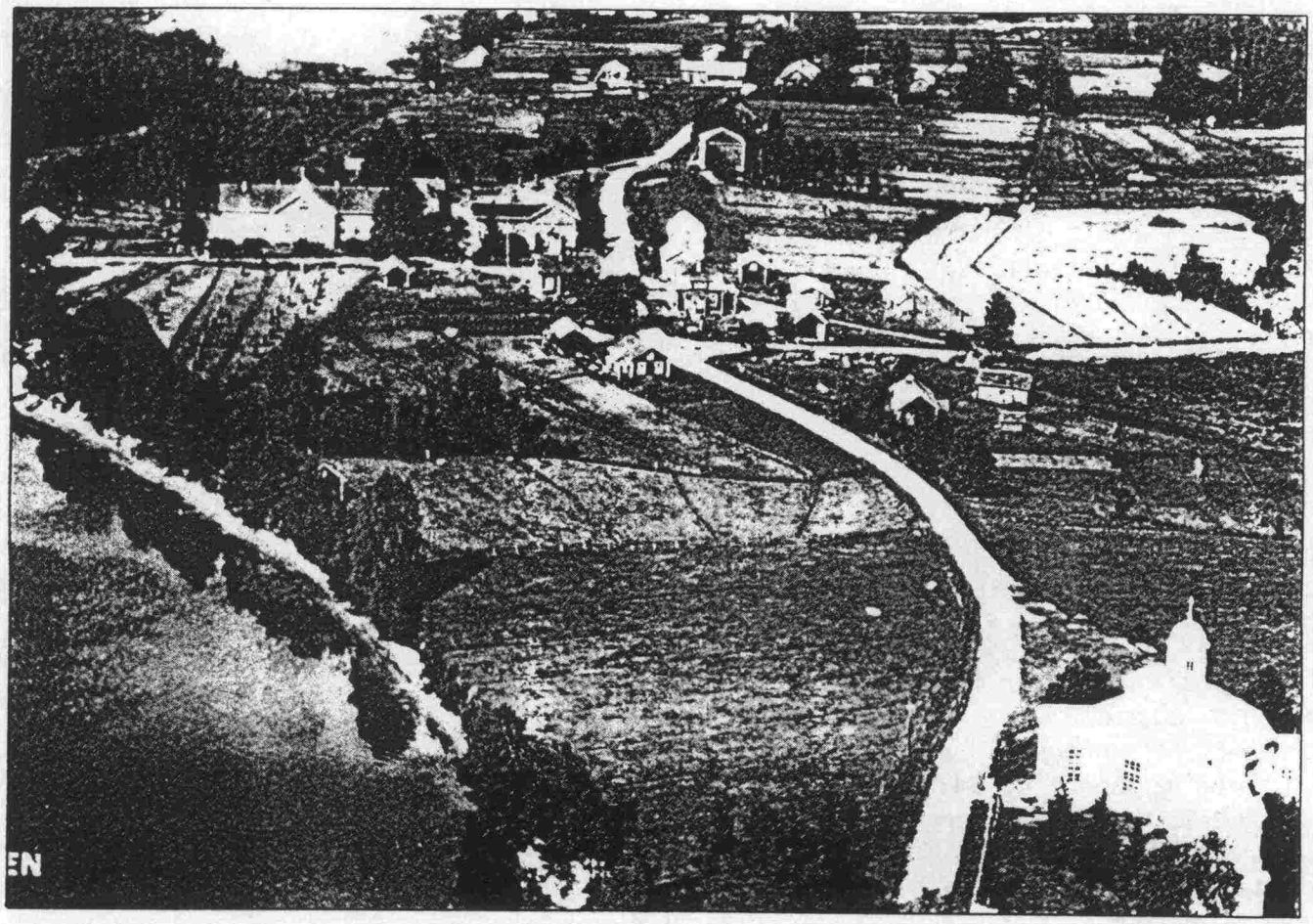
2/8. A Finnish church village highroad in the 1920s. Most of the plots are fenced because many houses still have a barn and cattle. The electricity and telephone poles along the road are a recent addition. The road is closely linked to the houses along it in both alignment and geometry. The photo also shows how well-defined the village is in relation to the surrounding countryside. Juva.

2/9. Fifties features are still clearly visible in the village center of Lammi.



spread. Stores have continually sought larger plots where they can fit in parking lots, together with convenient access and visibility from the main roads to attract customers.

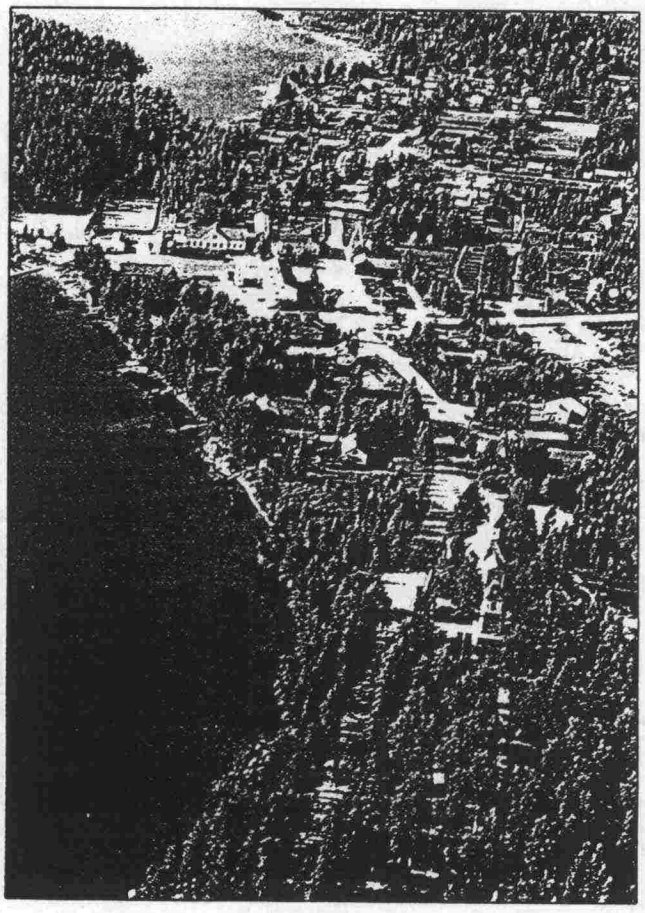
The environmental change that took place in the 1960s and '70s was quick and brutal, except in the few villages that were not hit by the mainstream of social development due to their poor location or other reasons. This change has disrupted or at least profoundly altered the old structure that had grown up over a hundred years.

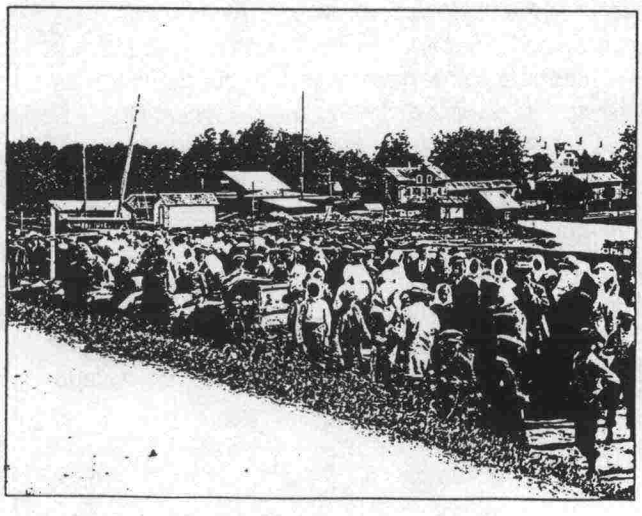


2/10. Sumiainen church village in the 1930s. This photo shows how open and treeless rural built-up areas used to be.

2/11. Sumiainen church village in 1990. The photo shows extensive new construction, but also how the fields and meadows have become forested. Sumiainen is situated on a lake, and the long views from the highroad have been preserved.

2/12. A market in Kauhajoki, 1914.





2.2 The development of throughroad design and its effect on the villagescape

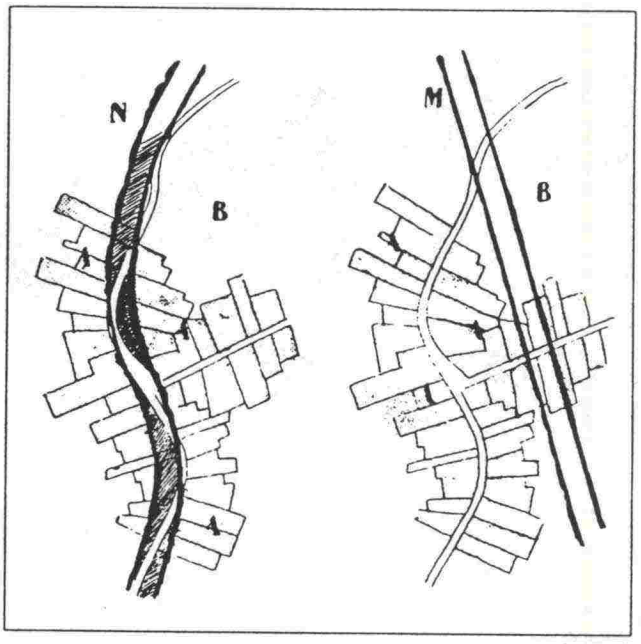
Road width defined by law

In the first Road Act passed in the independent Republic of Finland (1918), the width of a highway was defined as no less than 5 m. This only meant the road surface. Furthermore, the Act stipulated that no buildings were to be constructed closer than 2 m from the outer edge of the roadside ditch or closer than 3 m from the outer edge of the road slope. This only applied to highways in the countryside; the cities managed their own roads, and local roads were left to the tenants. Many local roads carried quite busy traffic, though.

The widths and vertical alignments of roads were not enacted by law again, since the definition of technical specifications was transferred to general guidelines issued by the Council of State and the more detailed instructions issued by the Roads and Waterways Administration in Finland (TVH). Several sets of these instructions were issued; the width of the road surface remained fairly narrow until the 1960s (5 to 7 m, paved roads from the 1950s 7.5 to 12 m).

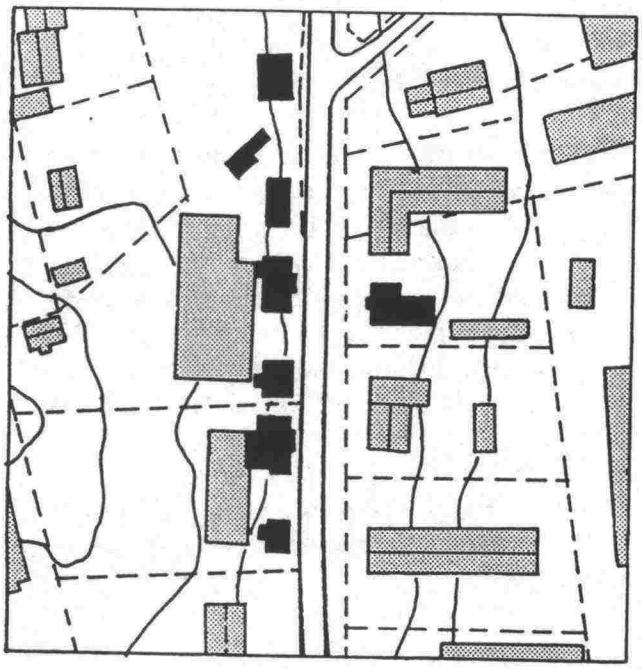
The zoning of rural built-up areas was already to some extent carried out under the provisions of the 1931 Town Planning Act. According to this Act, a 'construction plan' (later called a building plan) was to be drawn up for all rural communities. There was usually a heavy spate of resistance from landowners, particularly where roads were concerned, since the municipality was required to purchase the land that the road would occupy. Because of this, the Rural Construction Act was passed in 1949, making all construction in the countryside, apart from agricultural buildings, subject to permit. Furthermore, every municipality was to set up a building committee. Road areas were redefined: new buildings were to be placed no closer than 12 m or 7 m from the centerline of a highway or other public road, respectively. The provincial government could grant an exception to this, but could not extend the limit by more than 5 m.

2/13. Before the age of asphalt, village highroads were in bad condition in autumn and spring. Ylivieska church village highroad in the 1930s.



2/14. Professor Meurman, in his 1947 textbook on zoning, presented the bypass model for densely built rural villages developed by French architect Le Corbusier in 1929. Bypasses were meant to ensure a traffic network enabling greater speeds, but also allowed planners to tear down as few old buildings as possible and to avoid destroying the overall milieu.

2/17. The new legislation governing construction in rural built-up areas began to be felt in church villages in the late 1940s, particularly in municipalities that had suffered damage during the war. The photo shows new construction along the Kuhmo church village highroad in the early 1950s.



2/15, 16. In the 1960s and '70s, the appearance of many church village highroads changed fundamentally due to extensive new construction. The street space was expanded and straightened. The smaller built-up areas did not get around to this until the 1970s. These pictures illustrate the change in the street space in Rantasalmi. The buildings marked in black still stood along the highroad in the 1970s. The present buildings are marked in grey. The photo is from the 1930s.

Since the design of rural built-up areas was now governed by law, the technical specifications on road width became, in zoned areas, a traffic area allocation in the town plan, the extent of which was determined during zoning. The zoning work in rural built-up areas was undertaken by the National Board of Public Building and the National Board of Survey. Roads were still a problem in closely-built centers, and the planner was often joined by a representative of TVH in negotiations in municipalities. TVH also provided expert help by issuing operations on road and traffic designs in town plans.

Motor traffic flow the dominant design principle in the 1940s

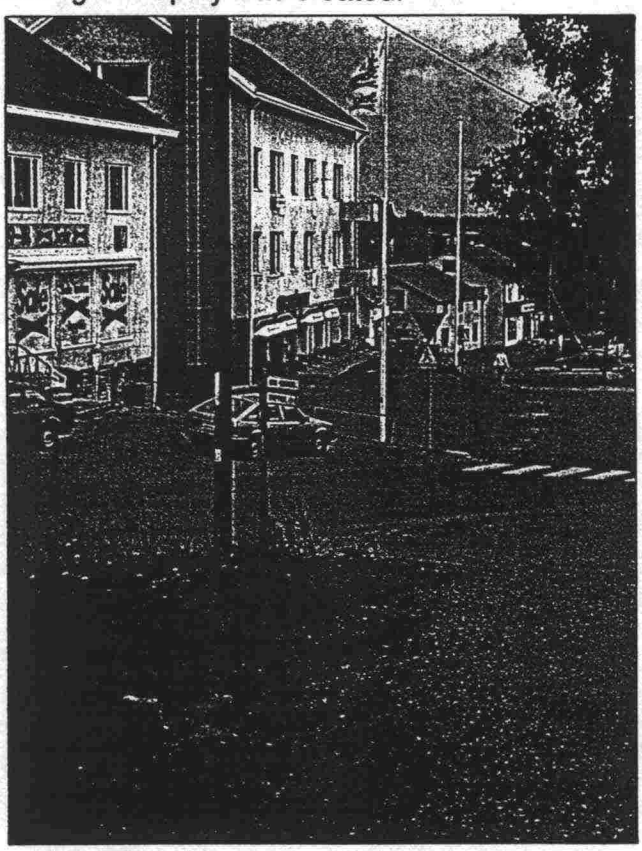
The growth in traffic volumes after the war and the general principle of organizing construction through a town plan, combined with the traffic safety concepts of the era, led to the widening and straightening of roads leading through built-up areas from the 1950s onwards. The leading authority in zoning, architect Otto-Iivari Meurman, discussed the zoning of rural BUAs extensively in his textbook on zoning, published in 1947.

Meurman considered it necessary for rural BUAs to be subjected to controlled planning. According to the Functionalist guru Le Corbusier, densely built villages had to be bypassed. A road passing through an old village need not be widened any more than fire safety and lighting conditions required. As far as road widths were concerned, Meurman alluded to the forthcoming Act on construction in country areas. Meurman's book was the only work addressing rural BUA design until the late 1960s.

From the 1950s onwards, traffic growth was one of the major reasons for considering zoning important in rural BUAs. Without zoning, roads could not be widened or straightened. The prevalent belief in technological progress, fired by industrial growth, held that good roads were one of the most important factors in future development.

According to the new Road Act, passed in 1954 and effective from the beginning of 1958, it was forbidden to build less than 20 m from the centerline of a highway and less than 12 m from the centerline of a local road (the corresponding distances in the 1949 Act were 12 m and 7 m, respectively). Thus, the width of the unbuilt area around highways grew from 24 m to 40 m. The provincial government, again, could grant an exception: the distance from the centerline could be increased up to 30 m. Furthermore, the Act transferred the responsibility for land purchase costs from local government to the State. This made the municipalities more amenable to road widening and straightening projects.

Apart from the new Road Act, the new Building Act (effective 1959) stimulated zoning in rural BUAs. The older construction scheme concept was replaced with the 'building plan'. In 1966, deliberation on the need for zoning was moved from the provincial governments to the municipalities. In other words, a municipal zoning monopoly was created.



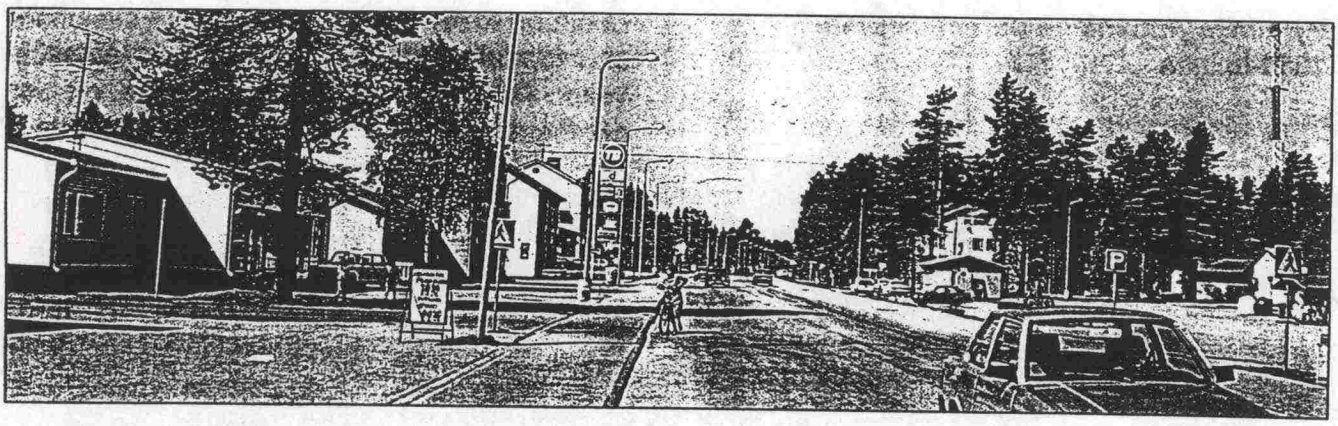
2/18. A frontage of buildings in Savonranta. The buildings are of different ages, reflect different eras, and, together with the terrain, form a highly original central square. Very few changes have taken place since the 1950s.

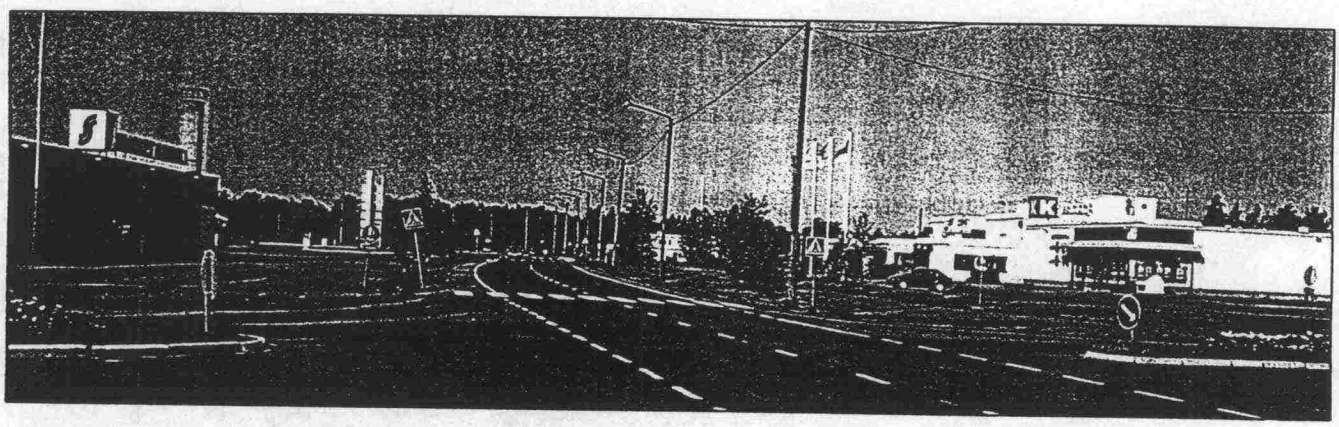
Bypasses and wide thoroughfares splinter BUA structures from the 1960s onwards

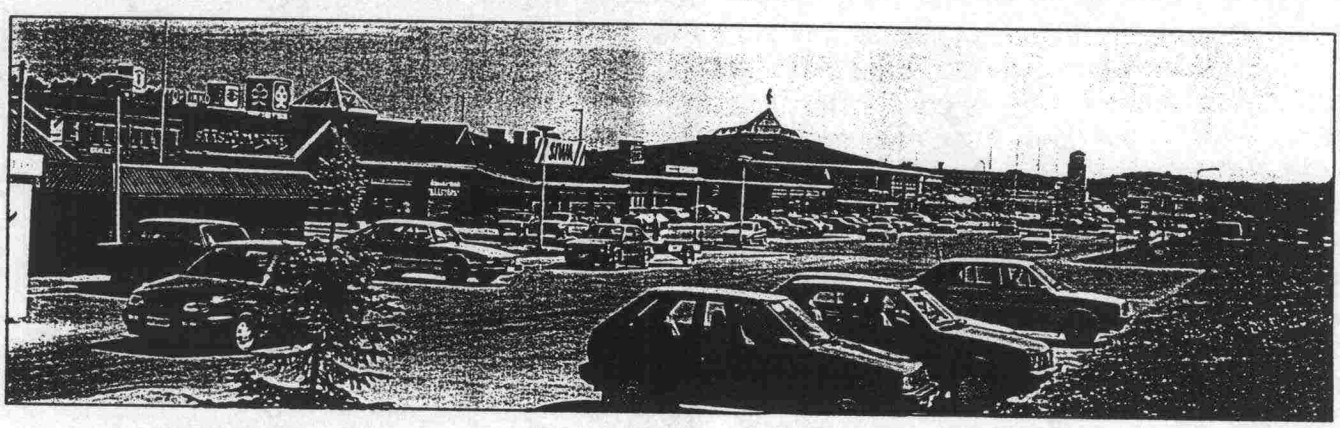
The demands of traffic gained more and more precedence in zoning in the 1960s. The road and its sidestrips extended 12 to 40 m from the centerline in the town plan. Within this area, old buildings could not be renovated nor new ones built. The parking places required by the enormous increase in the number of cars were placed immediately adjacent to the road, forcing the buildings further back. From the early 1970s onwards, a bike and pedestrian traffic route was sandwiched between the parking places and the buildings, meaning that the entire area between the buildings along the road was paved.

A BUA model based on the bypass road became very popular in the 1960s, and even small centers were converted to this model. The development was more or less the same in each case - a bypass was constructed with access to the shopping street through the built-up area; the residential streets in turn branched off the shopping street. In some cases, the center gravitated to the bypass, but a more common effect was that the business center gradually moved toward the bypass intersection. Municipalities usually encouraged this development through zoning and land acquisition, increasingly toward the late 1980s.

Municipalities have guided construction to land beyond the bypass through their zoning and land acquisition policies. In some cases this was the only way to provide the center with a direction in which to grow, but usually this was the way of least resistance in terms of politics and land-use policy. Since the war, many municipalities have already built several bypasses, previous ones having been assimilated into the built-up area. This has resulted in government investment, since the obsolete bypasses often remained in charge of the Finnish National Road Administration (FinnRA).



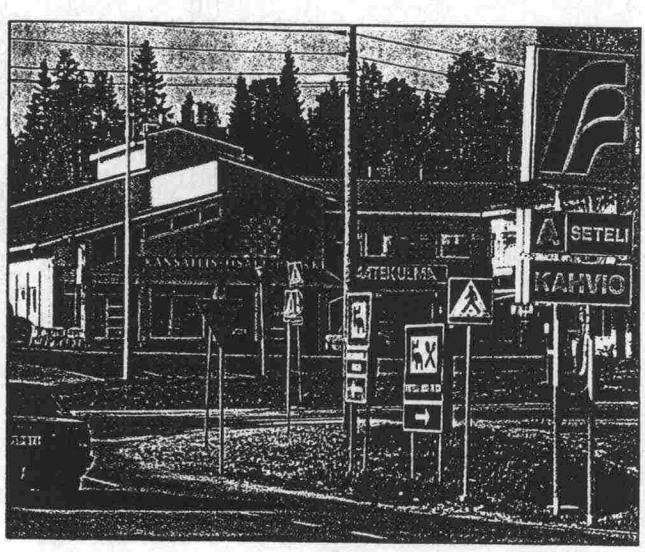




2/19. A spacious shopping street in Hyrynsalmi in the 1960s. Any improvements must focus on reducing the amount of paved surface.

2/20. A shopping street built in the 1970s. The highway-like traveled way is disjointed from the buildings and the plots. The buildings are so far apart that no shopping-street space can be visualized. The intersections are so far apart that the parking spaces are linked by driveways parallel to the street. The result is unsatisfactory for all users. Liminka.

2/21. A municipal center from the 1980s. Vääksy.



Attempts at improving the environment in the 1980s

Throughroads were constructed extensively in the 1960s and '70s. The large central traffic areas characterizing most church villages were designed during that period, and the traditional village highroad structure was altered by widening and straightening the road and moving the business buildings far enough from the road to provide parking places between the road and the stores.

In addition to creating wide expanses of paved surface, it was also common to define the vertical alignment of the road to suit the new hall-type business buildings. Old houses and stores near the road were left in a kind of depression.

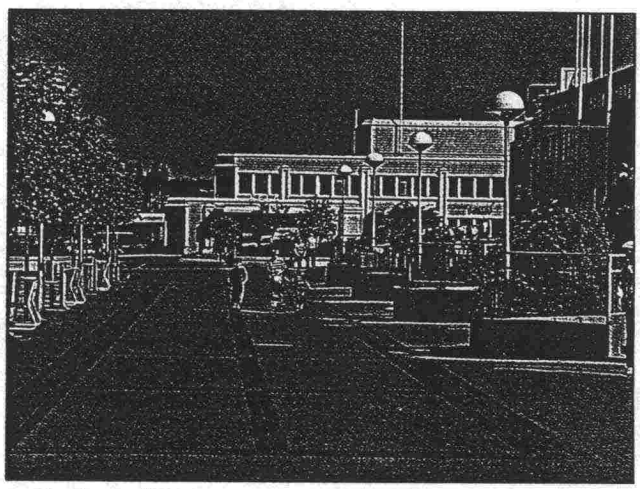
Due to road widenings and changes in land use, built-up areas wound up with various bits of unused land, such as patches of arable land and verge areas.

The startling rapidity of these changes in the country's church villages sparked some criticism of zoning and road planning as early as the late 1970s. Both FinnRA and some municipalities reacted to this, reviewing their development plans and reworking throughroad plans. These new plans aimed at organizing the traffic space with elevated sidewalks, traffic lanes, traffic islands or other such means.

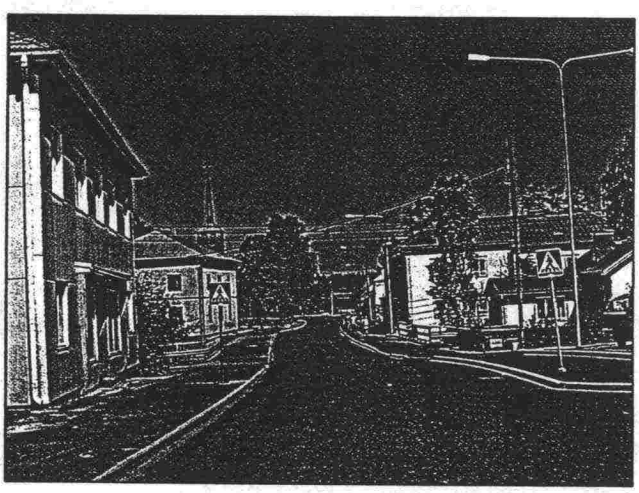
The new environmental improvement goals of throughroad design were set down in a special directive published by the Roads and Waterways Administration in Finland in 1984. Improvements based on this directive have aimed at clarifying the traffic structure of throughroads. In these new plans, the traveled way, bike and pedestrian traffic route and parking places are segregated with planting, islands and medians; extensive paved surfaces are broken up to enhance the villagescape, and details and high-quality road fittings (surface materials, curbstones, lighting, etc.) are used.

However, in many cases the throughroad has thus become separated from its environment. In clarifying the road environment, the geometry of the road was also corrected, resulting in higher traffic speeds. Intersections were made easier to negotiate, which did not make the situation for bike and pedestrian traffic in built-up areas any better. It is often difficult to cross a shopping street even if the villagescape has been slightly improved with a few trees.

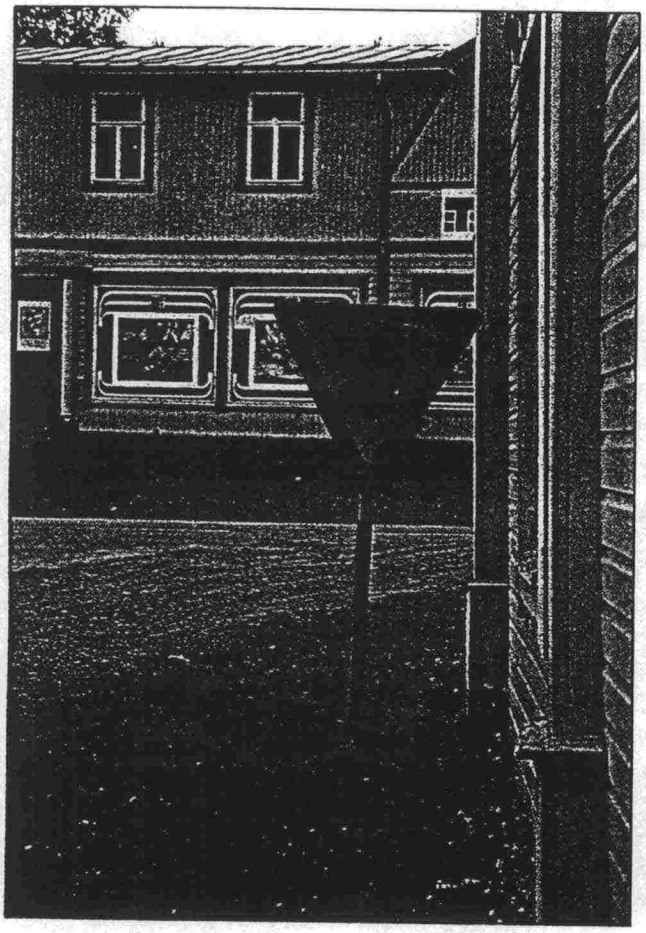
The results of road moderation undertaken in the 1980s are discussed extensively in a survey of throughroads published by FinnRA (Tielaitoksen selvityksiä TIEH 32000 76).

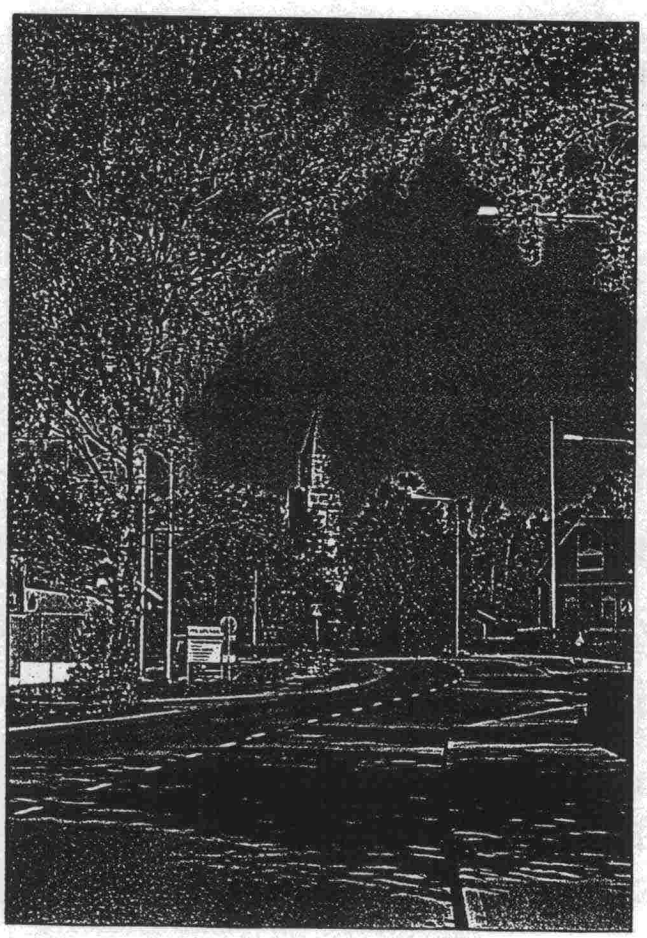


2/23. Part of the shopping street in a fairly large built-up area was converted into a city-style pedestrian precinct in the 1980s. Turenki in 1992.



2/24. Small built-up areas have lost their small scale and delicacy due to rigid technical designs, even if the aims were ambitious. Panelia 1992.





2.3 The end result - rural or urban community?

The land-use and environmental situation in Finnish rural BUAs in the early 1990s are the direct results of the zoning and road planning practices initiated in the 1960s. The reconstruction of centers and downtown roads begun then was completed at least once over in most built-up areas by the early 1990s. Most of the downtown building stock and practically all throughroads have been built during the past three decades. Thus, older constructions such as bridges and roads are exceptions. The newness of the environment and the tenuousness of its ties with its own history sets Finnish rural centers apart from the villages and small towns of Central and Southern Europe.

The economic boom of the 1980s manifested itself in opulent buildings that outshine those of previous decades. Particularly rural banks and retail chain stores invested in new buildings. The wealth of resources available also made better-quality design possible, such as stone paving and high-quality greenery along throughroads. However, the new building stock is architecturally diverse and partly of poor quality, though it was in the 1980s that architecture freed itself from the puritanism of earlier decades. Exceptions to this rule can be found in certain municipal buildings, designed by competent architects. Some new business buildings and apartment houses are also well suited to their setting. Many municipalities have managed to progress from words to deeds in preserving old buildings. The buildings and constructions in a typical rural BUA thus consist of layers representing different periods and their ideals. Change is slow, and the villagescape will always remain fragmented to some extent as far as the building stock is concerned.

Is a new small town possible or necessary?

Finnish rural BUAs can be broadly divided into three groups on the basis of their community structure and environment:

The first group consists of those that have preserved an organic structure that blends into the landscape. The original form of the center, often a village grown up around a village highroad, is still visible. The area has contact with the surrounding landscape, typically in the form of distant views of fields and watercourses.

The second group contains built-up areas that have urban properties. They have a dense and clear structure and centralized functions. The scale is small and the street spaces well defined. The urban space is clearly separated from the surrounding countryside.

The third group has characteristics of both village and town. These areas have highway-type road designs and a dispersed, spacious structure. The villagescape is dominated by facilities for cars. The environment seems to be in a continual state of flux. Most Finnish church villages belong to this group.

Any large built-up area typically has areas of different kinds. Many have preserved fragments of the old environment and its terrain. However, it is the surroundings of the central throughroad that determines the area's image.

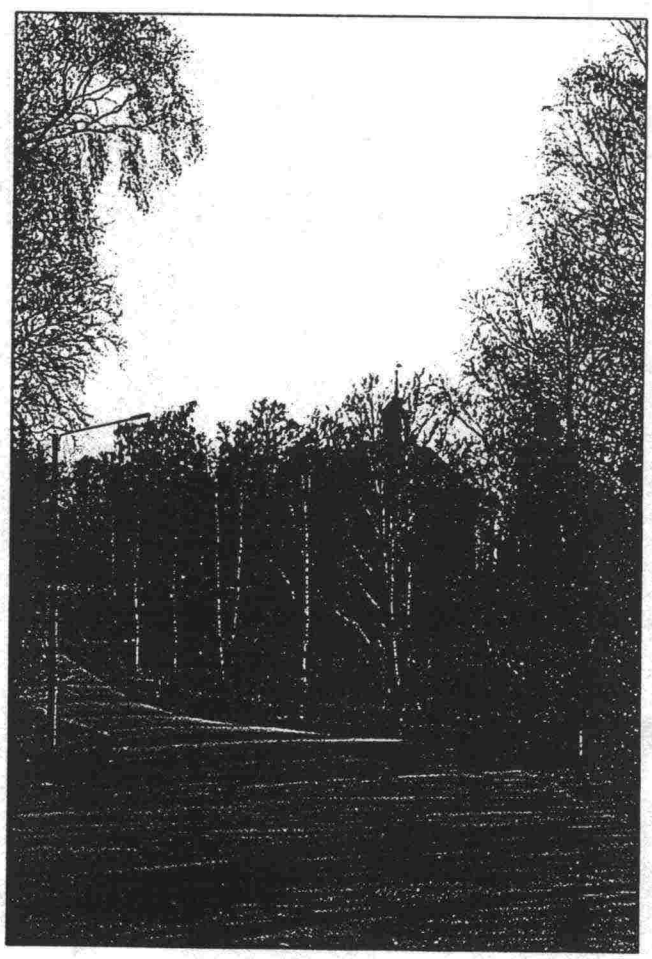
How urban an environment is does not depend on the population; it has more to do with the structure formed by the various functions, how the street spaces are defined, what the scale is like and how well the surroundings are managed. Old photographs show that the old village highroads were often more 'town-like' in scale and atmosphere than in many present-day centers. Naturally, there is no going back to the old environment, but these pictures give us an idea of how to organize a shopping street - with easy access from one side to the other, low traffic speeds and a variety of functions.

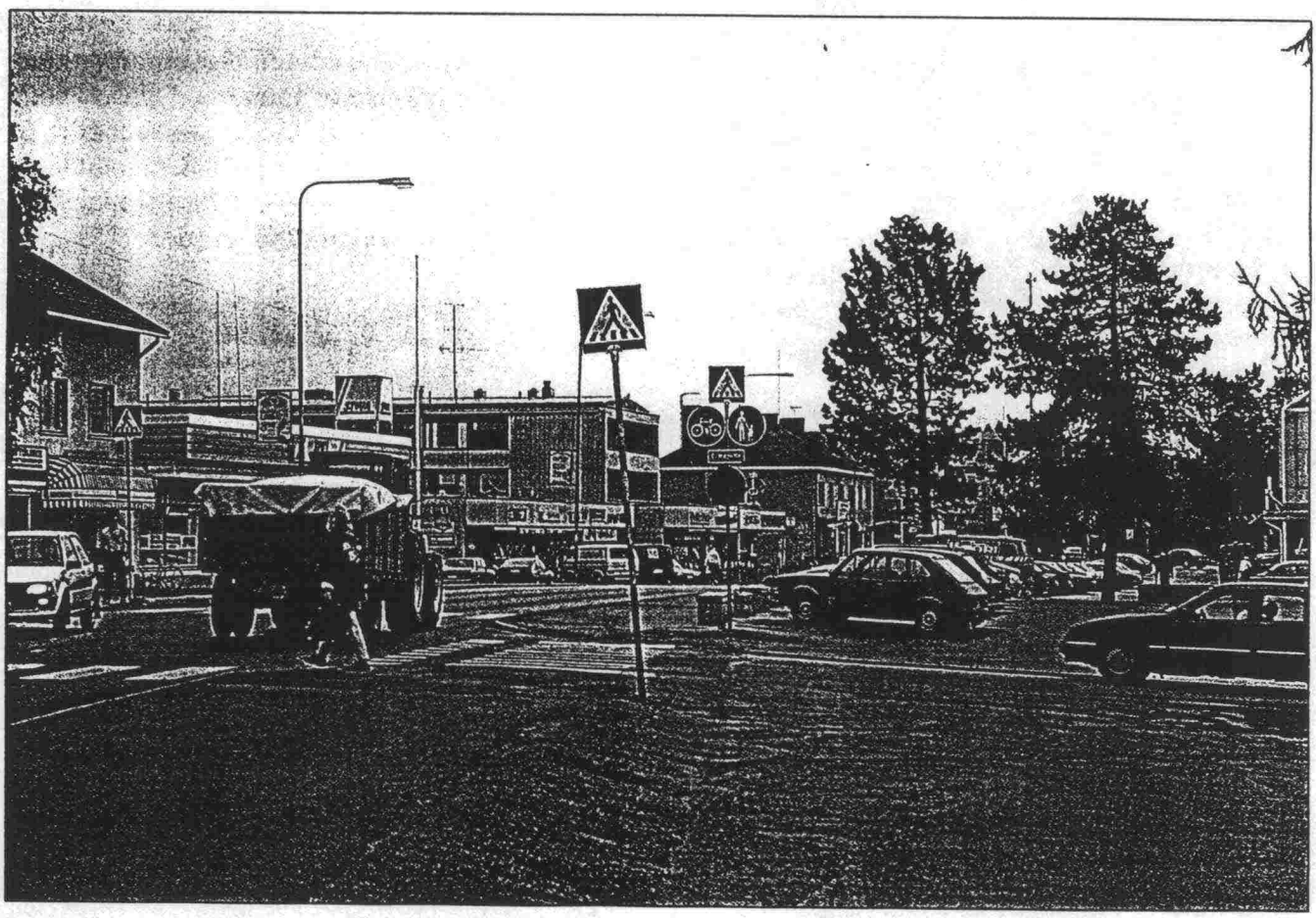
The villagescape is always a showcase for the values of the community that built it. Many municipalities have judged it wise to become urbanized, up to and including calling themselves 'cities'. However, an urban environment is very seldom set up as a goal in zoning, road planning or environmental planning. This is unfortunate, particularly since condensing the structure in terms of both functions and space and creating a smaller scale would, in many cases, enable the solution of many problems in the traffic environment, as we will show through the development principles and concepts discussed in the following sections.

2/27. The most important thing in improving the highroad in Sulva is to preserve its rural characteristics.

2/28. A new business center, with highway-like traffic arrangements that prevent the creation of urban street and plaza spaces. Pudasjärvi in 1992.

2/29. This shopping street has not yet been improved. The urbanized municipal center can be much enhanced by condensing the structure. Juva in 1992.





3 SAFETY ON PUBLIC ROADS IN BUILT-UP AREAS

The greatest problem on throughroads is poor traffic safety.

About 6%, or 4500 km, of all public roads are throughroads in the broad sense of the term, i.e. including center bypass roads and small roads in service centers. Throughroads handle 17% of the total kilometerage of motor traffic. However, throughroads account for 27% of all PIF accidents and for 19% of all traffic deaths.

The bike and pedestrian traffic safety problem is at its greatest on throughroads. Nearly half (47%) of all bike and pedestrian traffic accidents on public roads occur on throughroads. About half of the pedestrian PIF accidents occur during the twilight or dark (street lights). Most of the bicycle accidents occur in daylight.

The main risk groups for pedestrian and bicycle PIF accidents are children aged 7 to 9 and 9 to 14, respectively. The proportion of pedestrian and bicycle accidents is again higher for persons over 55 years of age. The leading age groups in moped and automobile PIF accidents are 15 to 17 and 18 to 24, respectively.

PIF accidents on throughroads occur most frequently in August and least frequently in March. The number of accidents per month is clearly greater in the May to December period than in the January to April period.

Some 2000 km of public roads are thoroughfares in zoned areas, i.e. the subject of this survey. About 55% of all PIF accidents on public throughroads occur on thoroughfares.

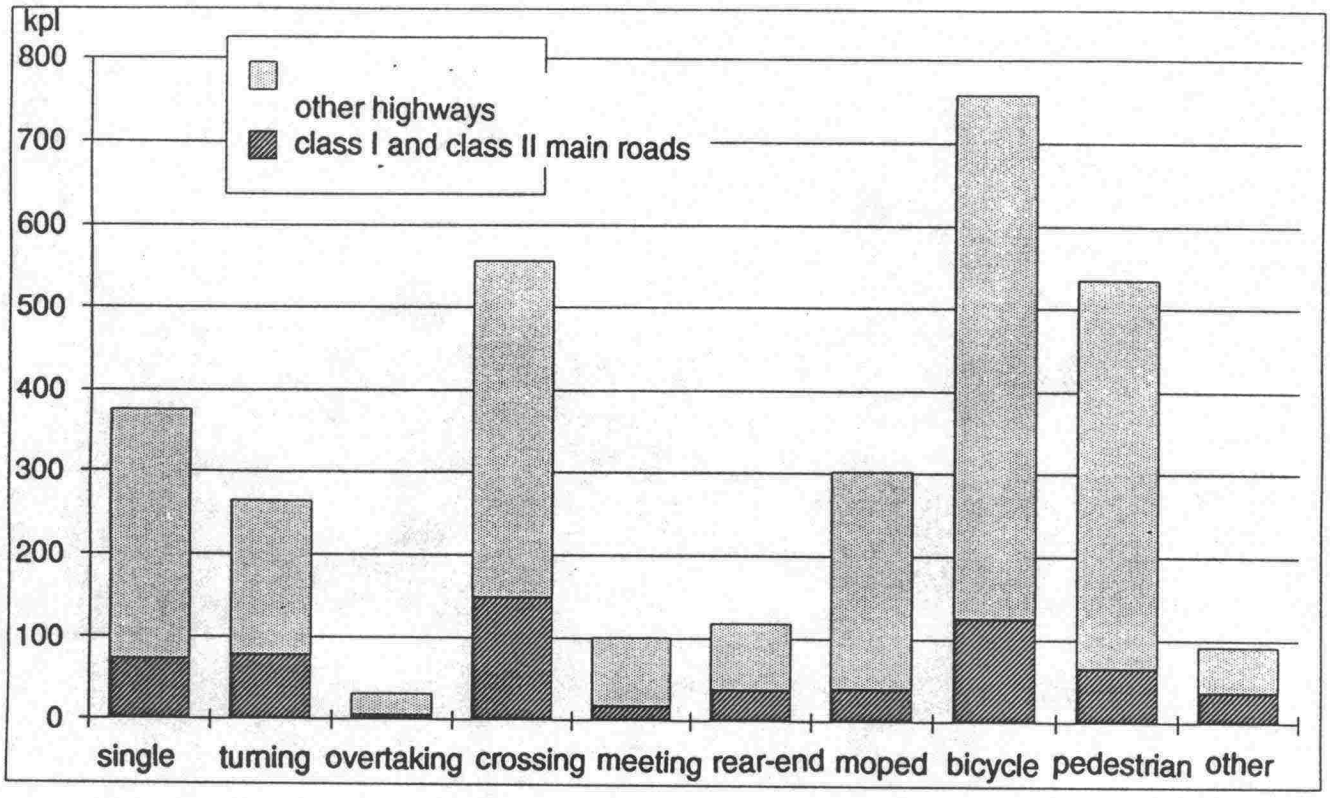
Sections of main highways (class I and class II main roads) passing through built-up areas account for PIF accidents as follows: 36% of bike and pedestrian traffic accidents, 24% of accidents at crossings and 12% of both single accidents and turning accidents (Fig. 3/1).

Other thoroughfares carry an even larger share of bike and pedestrian traffic accidents, 54%, while the proportions of crossing accidents and single accidents are 16% and 12%, respectively (Fig. 3/2).

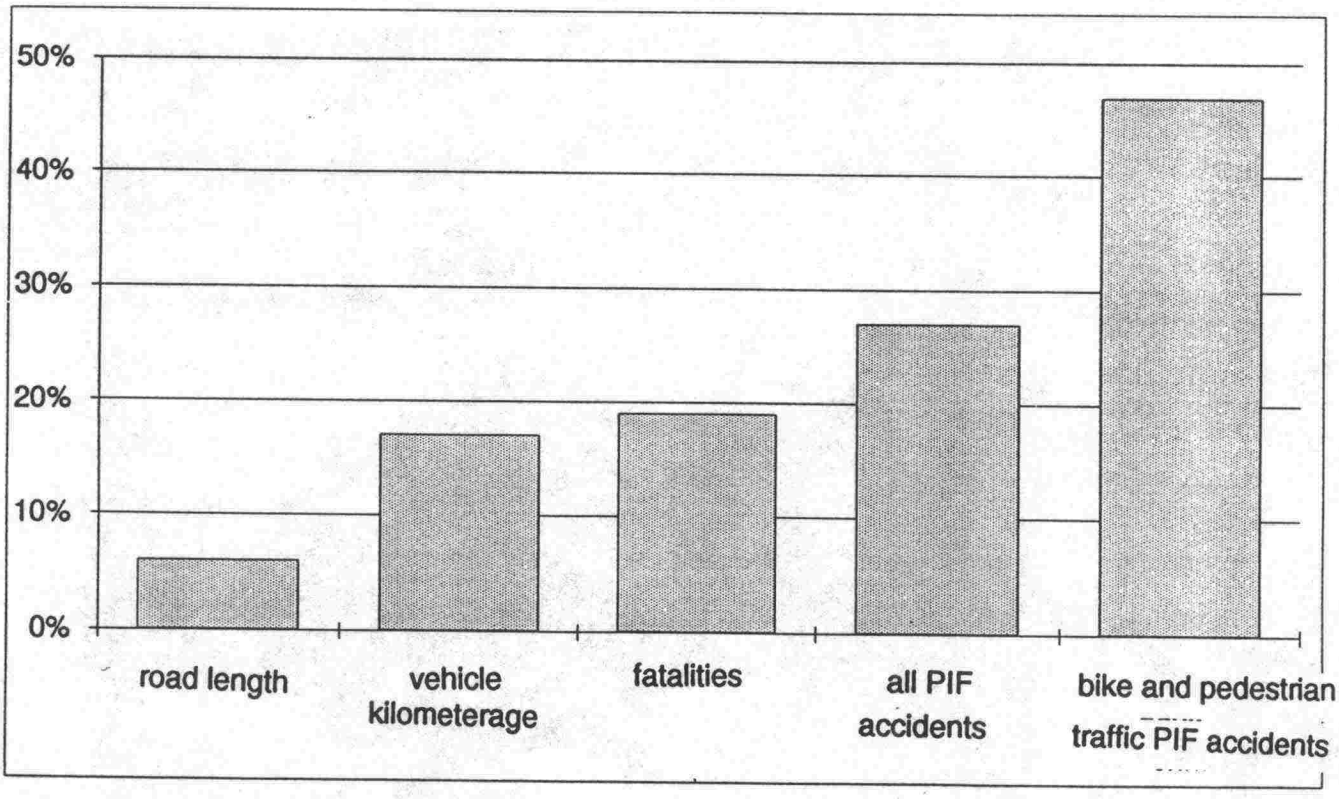
About one third of all persons killed in accidents on thoroughfares in zoned areas were killed in pedestrian accidents and about one fourth in bicycle accidents.

On approach roads in linear settlements, about 29% of all PIF accidents are single accidents and 21% are bicycle accidents. Most fatalities are suffered by pedestrians (29%) and bicyclists (21%). The next largest group of fatalities is in single accidents (17%).

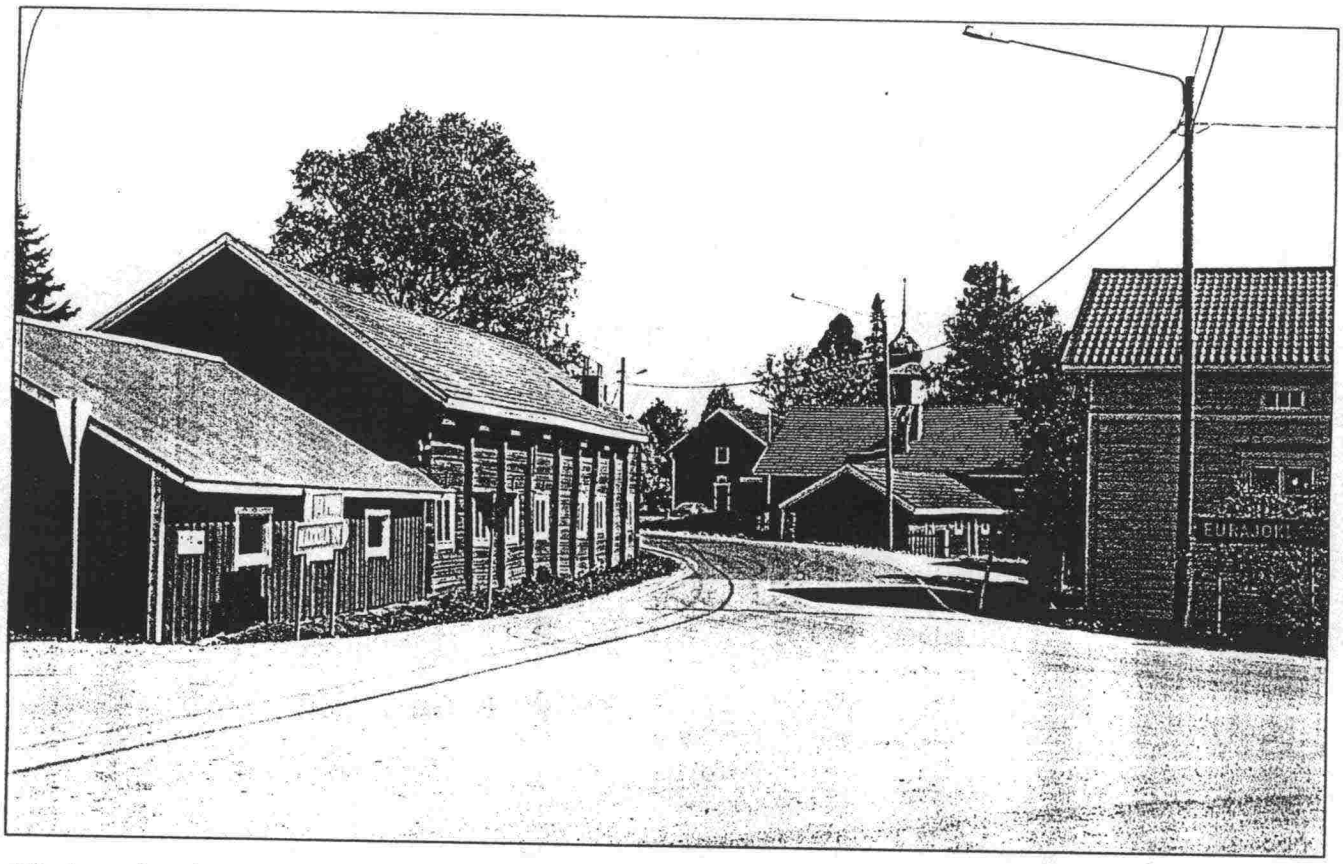
The PIF accident risk on public roads is greatest on roads passing through BUA service centers, the average being 66 PIF accidents per 100 million kilometers driven. These sections of road have an average of 0.7 PIF accidents per kilometer.



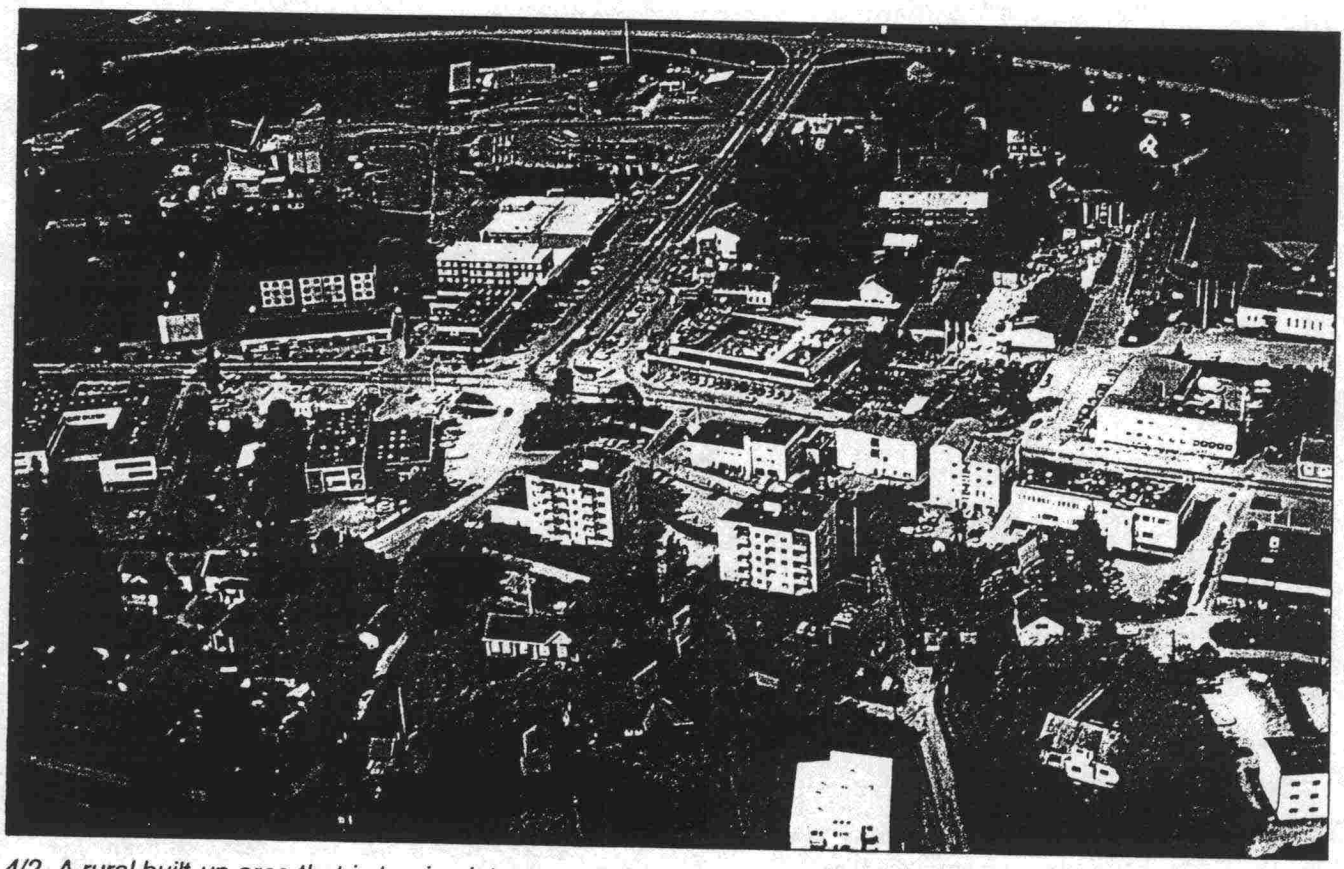
3/1. PIF accidents on thoroughfares in zoned areas between 1986 and 1990.



3/2. Throughroad shares of the length, motor traffic kilometerage, fatalities, PIF accidents and bike and pedestrian traffic PIF accidents on all public roads.



4/1. A small and slowly changing village that has retained its compact structure. Irjanne in 1992.



4/2. A rural built-up area that is turning into a small town. Orivesi in 1987.

4 DEVELOPMENT PROSPECTS FOR BUILT-UP AREAS AND THROUGHROADS

4.1 Development prospects for rural built-up areas

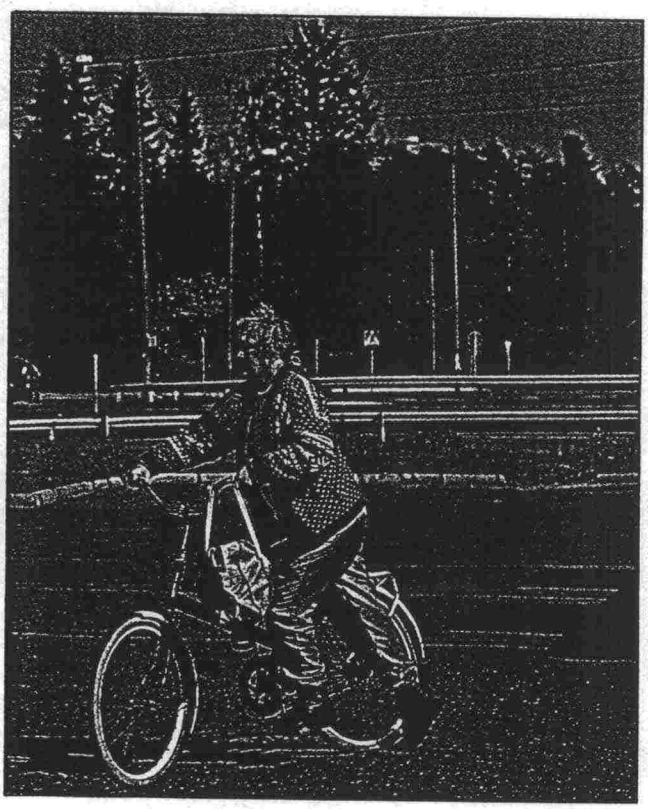
Most rural built-up areas have experienced substantial growth since the 1960s, mostly caused by people migrating from rural areas to population centers. Now, in the early 1990s, there is no more growth potential for built-up areas in rural areas and villages. Some such areas have grown due to the expansion of industries nearby or because of their proximity to a larger city. Work in public services and other jobs created from the 1970s onwards have also been important factors in BUA growth.

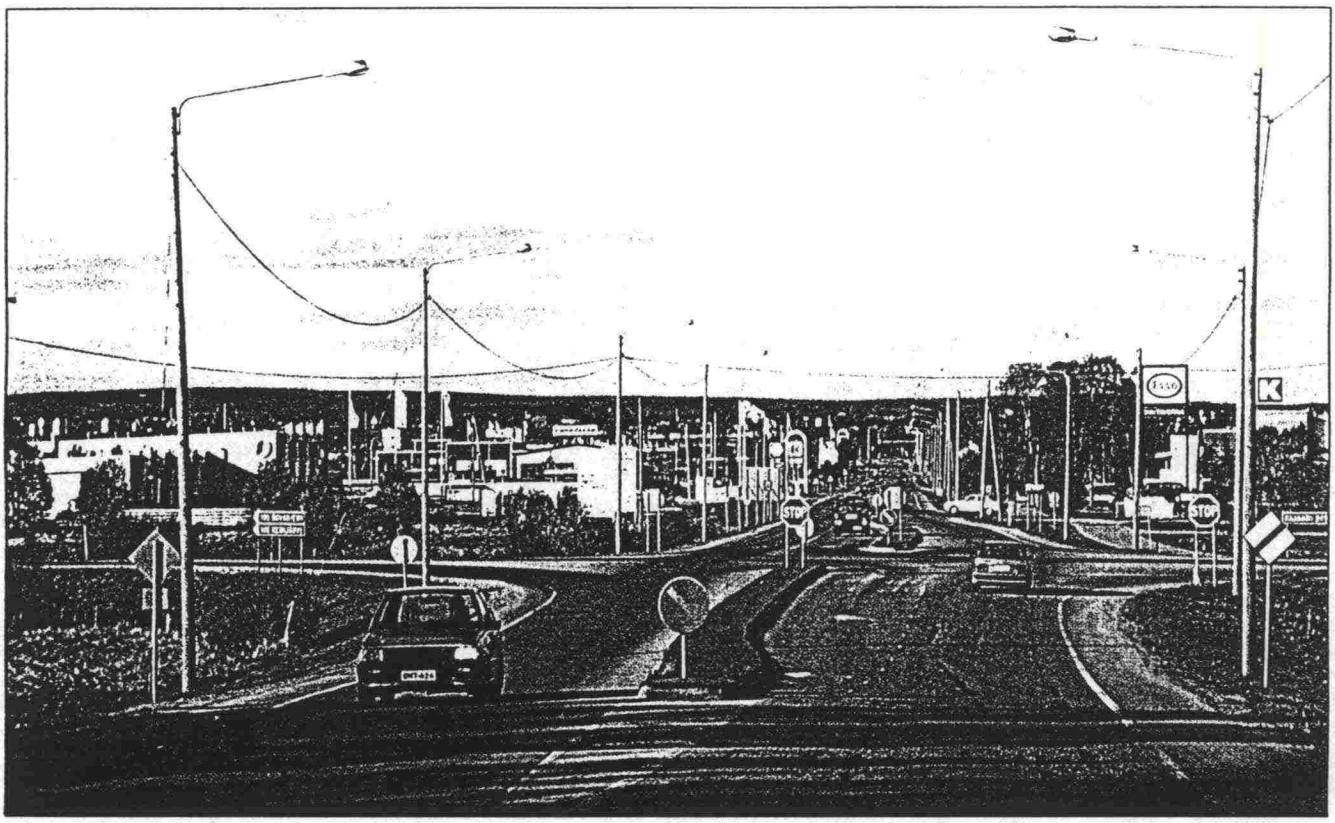
The effects of ongoing changes in the production structure and world politics can already be seen in rural built-up areas. Some of the jobs in built-up areas are at branches of large companies or sub-contracting firms that were founded on the strength of cheap local labor and regional subsidies. These jobs are now being moved to still 'cheaper' areas now available fairly close to Finland thanks to the upheavals in Eastern Europe. Alongside with the structural change in the private sector, the public administration is also being forced to trim down its functions. Thus, there are many factors threatening rural built-up areas in the early 1990s. The utilization of BUA growth potential and human resources will continue to depend on economic and regional policy.

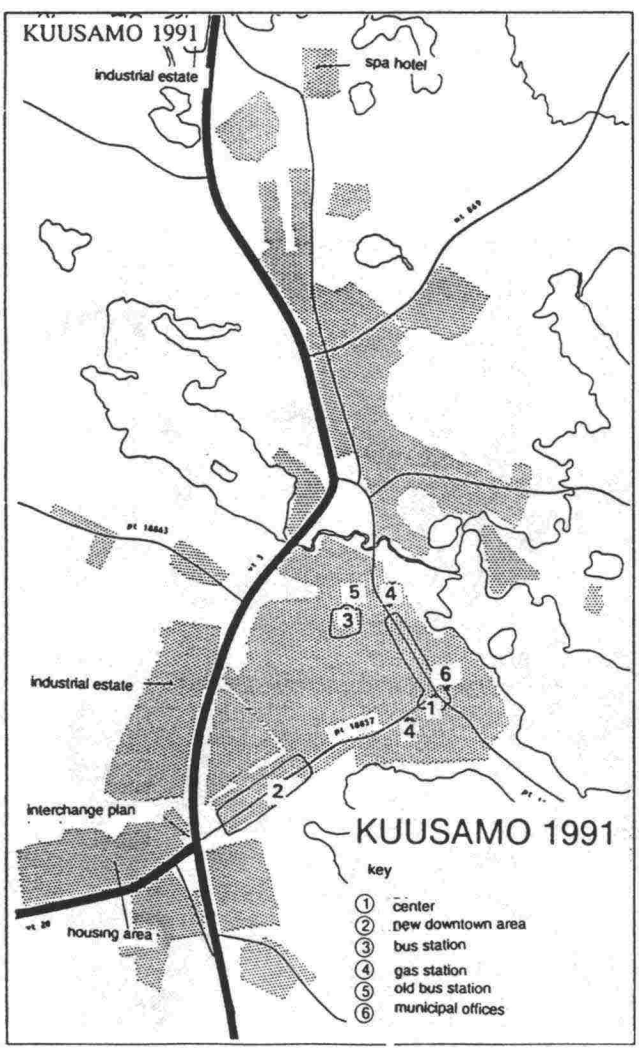
Rural built-up areas will probably continue to specialize even further. Some will still grow at a fairly rapid rate, but most will be faced with slow growth or even decline. Most of the growth areas are municipal centers close to large cities, and in a few individual cases the business base is particularly viable, for instance due to tourism.

There is every indication that no abrupt changes are to be expected in very many built-up areas in the near future. In the long term, however, development prospects are highly uncertain, particularly for smaller service centers. It will be very difficult to sustain growth, though there will still be some construction for different reasons, such as changes in the service structure and increasing occupancy density.

Local building plans allocate plenty of business in centers and at intersections of approach roads. It is improbable that any extensive new business complexes could be built in the near future, since most built-up areas already have excess business space as a result of the '80s boom. All economic prognoses suggest that purchasing power will not grow significantly. There is precious little to be gained from through traffic, except in the case of a few service outlets adjoining national main highways.







4/4-5. In Kuusamo, commercial services have traditionally been located along Kitkantie. In the early 1980s, a business area was zoned along Ouluntie, beginning from the intersection of Highway 5. A large supermarket and an Alko store have been built in this area. The municipality has placed a new school to the west of Highway 5 and decided to zone an apartment house area close to the intersection, thus creating a new business center that attracts motorists. Keeping the old business center viable in this situation will require active measures on the part of the municipality.

4/6. Trade needs can be met in existing centers without disrupting the community structure. This well-balanced shopping street in Ilmajoki shows how the space delimited by the buildings has been utilized in road modification. The alterations are modest and fit in well with the environment.

4.2 Community structure and sustainable development

The Building Act stipulates that community design and construction must follow the principles of sustainable development. The current shortage of resources has a similar effect. The principles of sustainable development are currently being examined in research projects in Finland and abroad. At the moment there are no ready models that could be routinely applied. The following general points are important in BUA land use and construction, and particularly in throughroad modifications:

In designing the structure, the decreased availability of resources and unsure future prospects indicate that all land-use and traffic planning should be based on developing and complementing the existing structure. The main aim is to condense the community structure, utilizing existing frameworks. The focus of any action taken should be on maintaining and renovating structures.

The aim of land-use planning must always be to minimize the volume of traffic.

The time factor is an essential part of community design in terms of sustainable development. In addition to the existing short-term, medium-term and long-term perspectives, an extra-long-term perspective must be introduced. This means an indefinitely long period, i.e. any length of time during which present conditions and designs can be held to be effective, by any criteria whatsoever. It is particularly well justified to apply this principle to community structure design, since the physical lifespan of such structures is measured in decades or even centuries.

It is always a good thing in terms of sustainable development to use areas already built up and to avoid taking up new land (cultivated or in its natural state) for roads or construction.

Land-use and traffic plans that would disrupt the community structure must be viewed with great caution, particularly those that require the relocation of the center or its functions, or that would spark off a process leading to this. Even during periods of growth, most built-up areas have not had sufficient potential to expand their centers; thus, the present depleted resources should be allocated to investments that improve existing structures and environments.

Functional diversity should be encouraged, particularly in central areas in built-up areas. Even new building plans contain areas exclusively reserved for business premises in centers, though these centers are often very well suited for housing, too.

Recycling - reusing materials and restoring them to nature - should be favored in community waste management planning.

At the level of detailed zoning and road planning, the above principles mean the following points must be taken into account:

In small built-up areas in particular, road modifications should be implemented locally, with minimal upheaval. The necessity for new road alignments should be very carefully considered.

Despite changes in shopping practices, all businesses and stores should be kept in existing shopping streets as far as possible. All opportunities for constructing new housing inside the existing structure and near existing services should be utilized.

In centers, and particularly in shopping streets, pedestrian movement should be made easier through road design and zoning. This means keeping travel speeds low in shopping streets. At the same time, parking space must be provided and service access ensured.

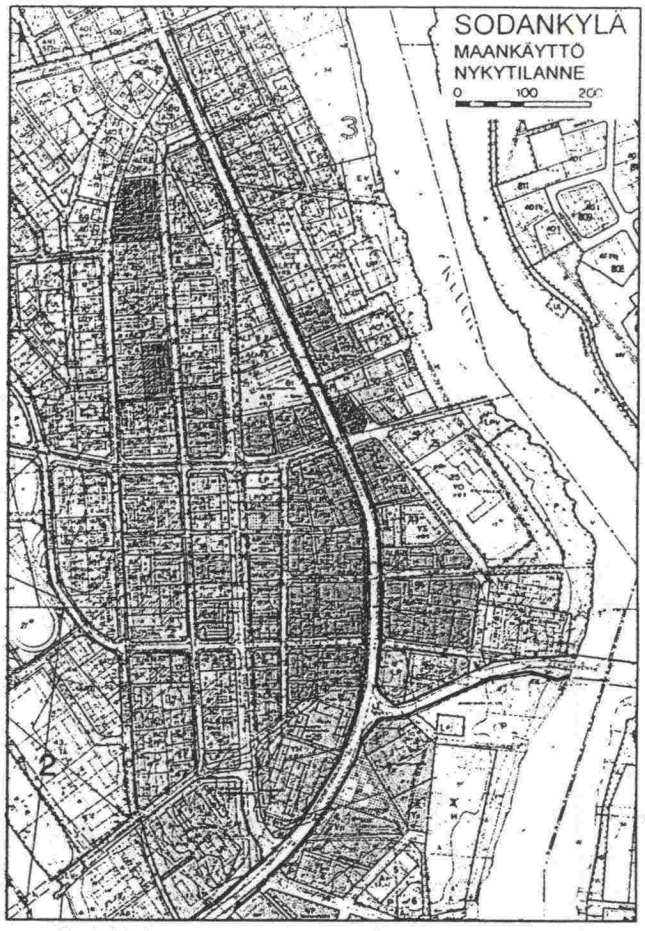
Road plans must not require old buildings to be torn down, nor hinder their maintenance.

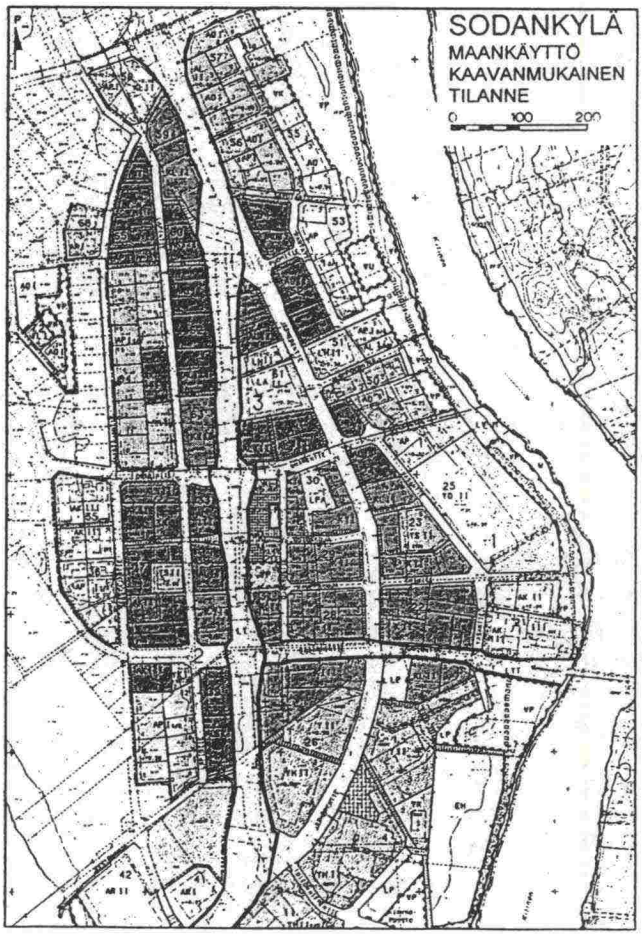
4.3 The throughroad design situation

In 1992 and 1993, road and waterway districts have initiated a survey of the state of public roads passing through rural built-up areas and the centers of small towns. This survey encompasses land use, villagescape and the smooth functioning of traffic. For FinnRA, the purpose of the survey is to produce a plan of action which can be used to improve the state of public road environments in built-up areas in cooperation with the municipalities concerned. The survey also helps with specific aspects of planning in throughroad projects. It covers centers in which throughroad arrangements have been made or which are known to require improvement because of traffic safety, for instance.

All road and waterway districts have throughroad plans that are complete and ready to go. There are even more general throughroad schemes affecting land-use planning. These plans should be updated to match current planning principles.

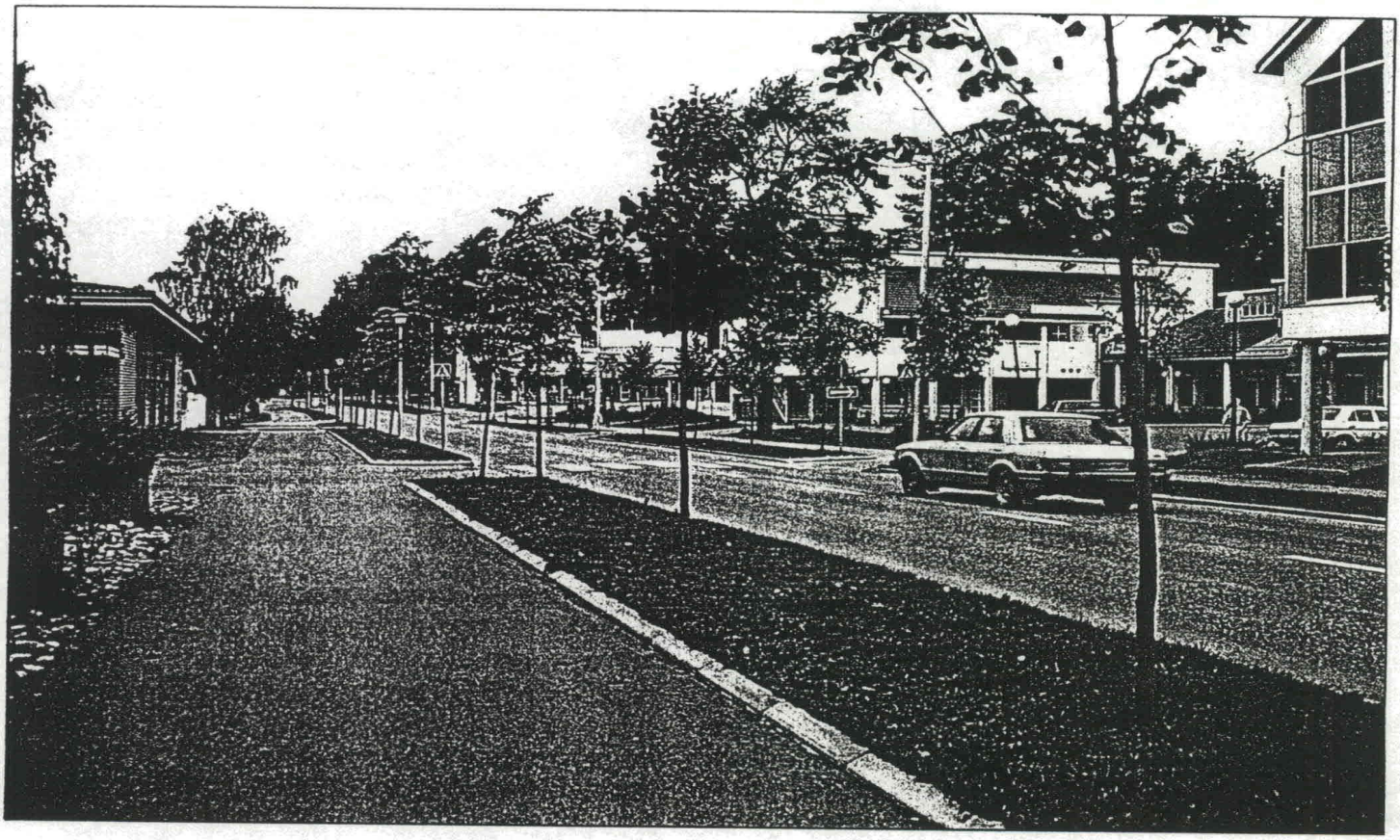
So far, no throughroad plan executed has aimed at bringing the average travel speed below the general built-up area speed limit of 50 kph. This, however, is the only efficient way to improve the safety of throughroads. Depending on local conditions, improving safety and the traffic environment can require major or minor alterations, but achieving these goals requires all throughroads to be re-examined from the point of view of current planning principles.

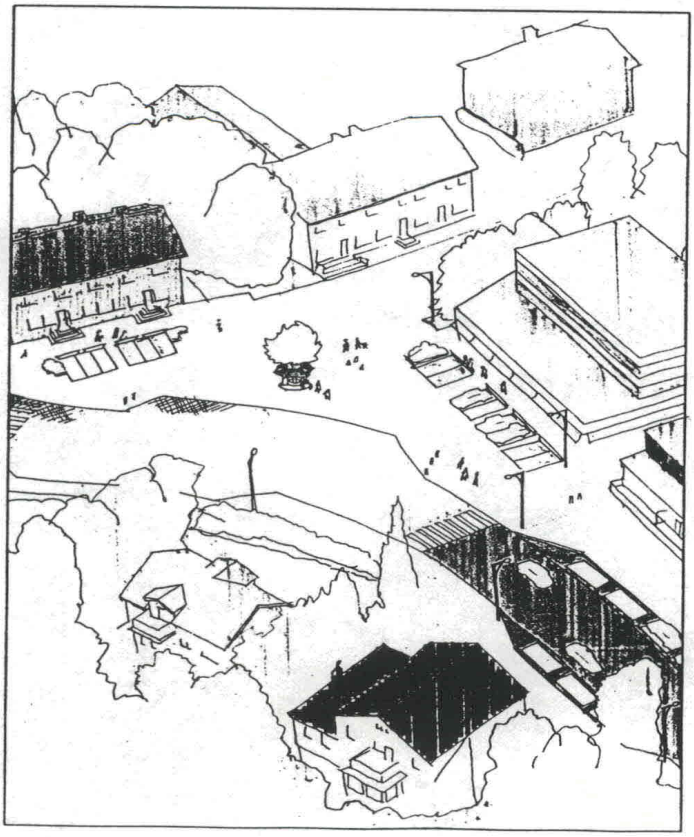




4/7. Land use in the center of Sodankylä at present.

4/8. Shifting Highway 4 as planned would move the shopping focus in Sodankylä to the new thoroughfare.





4/9. A new shopping street in Laukaa. The project was carefully planned and executed, producing a controlled, balanced and pleasant small-town environment.

4/10. A throughroad design that preserves the shopping square. Vihti throughroad plan, 1992.

5 THROUGHROAD AND ZONING DEVELOPMENT NEEDS

The following discusses the major areas requiring new goalsetting and planning that emerged in the course of this project.

Cooperation

Throughroad improvement design is not possible without close cooperation between the zoning planner and the road designer. Throughroad design is nowadays always done jointly by the Finnish National Road Administration and the municipality concerned, ensuring the availability of sufficient resources and freedom of design.

For cooperation to succeed, the design team must be motivated and willing to commit themselves to the job in hand. When examining throughroad cases for this project, we found that the zoning amendment made in connection with road design often only recorded the boundary alterations and so on required by the road plan, without any mention of environmental design. This is not design cooperation, merely one practical aspect of the road plan.

An open planning process should be used in throughroad design, involving property owners, other residents and road users in examining the problems, goals, and alternative designs.

The authorities responsible for maintaining and building the road must also be consulted at the design stage. Maintenance problems, for instance, must be charted early on so that they can be solved and thus prevented from undermining the basic principles at a later stage of the design process, or even during construction.

Road and environment design in a built-up area is demanding work, since the scale is small. To achieve a good result, the planners must understand the features of a rural built-up area and be sensitive to the peculiarities of the villagescape. They must be creative in applying design standards and principles. This skill comes through experience and genuine interest.

The Finnish National Road Administration could consider forming special planning groups specializing in throughroad design.

8 KOTIMAA KESKISUOMALAINEN 10.12.1992

Tie voi säästää kyläraitin Sumiaisissa

Pekka Tiihonen

Tiesuunnittelijat ovat löytämässä viisasten kiven, jonka ansiosta tien korjaajat eivät riskaa Sumiaisten kirkonkylän raittia.

Keino on yksinkertainen: hillennetään nopeuksia "porteilla" ja annetaan kirkonkylän tien kulkea nykyisellä paikallaan.

Puut, kivet, istutukset ja tien laidan rakennukset säästyvät, kun mutkia ei oiota eikä mäkiä tasata. Kun suurin nopeus pudotetaan 30 kilometriin tunnissa, tietä ei välttämättä tarvitse leventää rakentamalla viereen kevyen liikenteen kaistoja.

Maisemaa säilyttävää suunnittelua esittää tiehallituksen alainen työryhmä, joka hakee uudenlaista näkökulmaa taajamien teiden suunnitteluun. Ryhmä on iskenyt silmänsä Sumiaisiin, koska kyseessä on yksi valtakunnan kauneimmista ja säilyneimmistä kirkonkylistä.

Keski-Suomen tiepiirin suunnittelupäällikkö Seppo Kosonen sanoo olevansa työryhmän kanssa pitkälle samaa mieltä.

Sumiaisten valtuuston puheenjohtaja Risto Lepänjuuri on mielissään uudesta käänteestä tien suunnittelussa. Moni on ehtinyt jo murehtia, kuinka pahasti kirkonkylän tien korjaus tulee vaurioittamaan arvokasta kyläraittia. Tähän mennessä on arveltu, että tielaitoksessa tunnetaan lähinnä leveä ja suora malli.

Lepänjuuri uskoo, että valtaosa asukkaista kannattaa säilyttävää mallia. Ajatus käy hänen mukaansa yhteen myös kestävän kehityksen projektin kanssa.

Tiehallituksen alaisen työryhmän jäsen, diplomi-insinööri Seppo Karppinen sanoo, että työryhmä esittää kirkonkylän eteläpäähän kirkon viereen eräänlaista porttia. Portti olisi käytännössä tien kavennus ja jyrkkä mutka, jossa Suolahden suunnasta tulijan on hiljennettava nopeutta. Myös raitin pohjoispäähän esitetään tien kavennusta. Kunnantalon edustan kauppa-aukiolle esitetään kivistä koroketta. Reunatöyssyistä ja kivipinnasta autoilija tuntee, että kyseessä on todella hiljaisen nopeuden paikka.

Pekka Tiihonen

Sumiaisten kunnantalon edessä olevalle kauppa-aukiolle esitetään nopeuden hillitsijäksi kivipintaista koroketta.

Pienemmälle kauppa-aukiolle esitetään saareketta, jonka kahta puolta kulkijoiden on kierrettävä.

Työryhmään kuuluva arkkitehti Jukka Turtiainen sanoo, että Sumiaisissa on jäänyt yksi tien rakentamiskierros väliin. Muualla taajamissa tiet on levennetty, korotettu ja tasattu sekä viereen rakennettu kevyen liikenteen väylä. Nuo tiet eivät monestikaan sovi ympäristöönsä. Lisäksi ne eivät ole turvallisia ajoradan ylittäjille, koska suorat ja tasaiset tiet houkuttelevat suurin nopeuksiin.

Values and attitudes

Rural built-up areas rarely have great technical traffic problems, whereas road construction nearly always affects unique features in the environment. In nearly all cases, these features have to do with 'soft' values - a solitary rocky outcrop or tree or a somewhat decrepit old building, that is, things that cannot be quantified. Their value is recognized only when they are gone. Large-scale design and unhindered motor traffic flow is often justified as "technically necessary", although this is more often a question of attitudes and the values that underlie them. The parties to the design process should establish a common set of values, or at least the relative importance of conflicting values.

Planning work must be based on realistic problem analysis and clear goalsetting

To achieve a good result, it is essential to establish exactly what the problems are that require solving. Likewise, correctly scaled solutions to these problems must be found. In examining executed throughroad designs, we found that the new arrangements were often unnecessarily extensive in relation to the traffic volumes concerned. It seems that tangible design concepts are outlined on paper even before land-use development, the real needs caused by traffic problems or the constraints imposed by the environment are charted. This means that the problem analysis is only half done or completely neglected when planning begins. Solving one problem creates new ones or requires a completely new improvement. A typical example of this is to improve traffic flow by altering road geometry; this leads to a safety problem (higher travel speeds) and an environmental problem (greater vertical alignment).

A consensus of opinion between the zoning planner, the environmental designer and the road designer on the problems to be solved, the environmental goals and the constraints imposed by the environment must be reached before planning goals are set and design concepts formulated.

Developing BUA structure and fitting the road network into it

Improvements in the community structure of built-up areas must be based on using the existing structure, network and land use as efficiently as possible. The goal in the case of land use and the road network is to reduce motor traffic. This goal can be achieved by placing new housing so as to support services and by building a bike and pedestrian traffic network that is as functional and safe as possible.

Functional diversity should be favored in land use in centers, i.e. business and housing must be mixed. Although business premises tend to gravitate toward larger plots, zoning and road design should attempt to create feasible conditions for businesses in existing centers. In many cases, business centers have migrated to bypass intersections. Due to this, the villagescape in the new centers is incomplete and the old business centers decline since there is not enough purchasing power to support the services. The main goal is to avoid all changes in land use and the road network that would lead to the creation of new centers or other disruption of the community structure.

Structural consolidation in a rural built-up area must not weaken the relationship between the area and its landscape. Quite the contrary, the views of fields and watercourses from the downtown streets should be preserved and even increased. Open spaces, ridges, and other original terrain features within the area should be preserved.

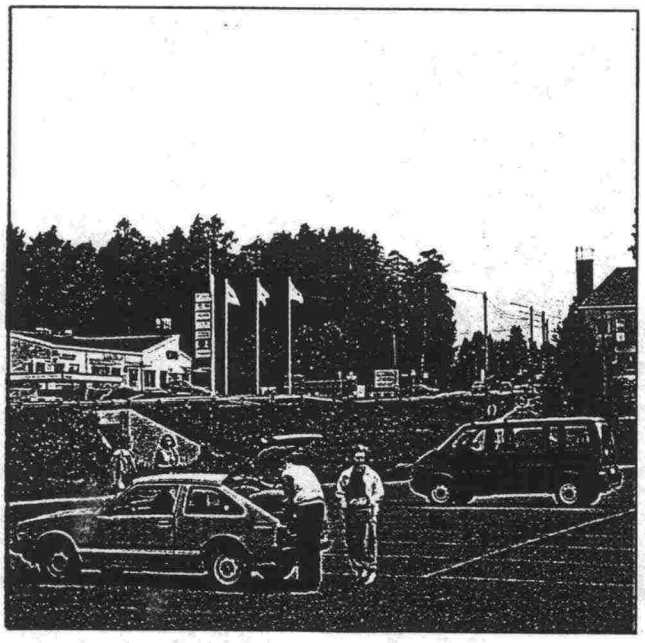
In examining throughroad projects, the cost estimate should include not only the road modification costs themselves but any costs caused by the potential disruption of the community structure. Downtown road improvement cannot be deliberated on the basis of traffic economy alone.

Fitting the throughroad into the local functions and environment

In a built-up area center, the traffic on a public road consists nearly exclusively of local traffic within or into the area. Before beginning to plan a throughroad, its role and character must be determined separately from the road network plan, yet partly based on it. The role of a throughroad is determined not only by its traffic, but also by the features of its environment. Hence, it must be integrated with its environment. To this end, the throughroad can be segmented to suit the features of the environment, and the road design should be based on this segmentation.

The throughroad must serve the traffic generated by different functions. The traffic-generation points must be established in cooperation with the zoning planner, and bike and pedestrian traffic connections between these points must be provided for. Planning of the placement of new functions and bike and pedestrian traffic connections must aim at reducing motor traffic within the built-up area. By cooperating closely, the zoning planner and road designer can avoid creating new traffic problems

5/5. A throughroad improvement executed in isolation from the environment creates an uneasy relationship between the two. Petolahti.



Improving the status of bike and pedestrian traffic

To improve traffic safety in built-up areas, it is essential to improve the safety of bike and pedestrian traffic.

The bike and pedestrian traffic network and its crossings with roads must be designed with the various user groups and their access needs in mind. Road crossings must be made easy and safe for children and elderly people, particularly along the routes they use regularly near schools and service outlets, and on shopping streets and market squares where there is a lot of bike and pedestrian traffic crossing the road.

Bicycling safety can be increased, particularly on school routes, by improving crossings between throughroads and side roads. Bicycling safety on shopping streets can also be improved by parking design.

Traffic moderation

Travel speed is of crucial importance to bike and pedestrian traffic safety. If a car is traveling at 60 kph when it hits a pedestrian, the pedestrian will die in 70% of cases. If the travel speed is 40 kph, the accident will be fatal in only 15% of cases (Fig. 5/7).

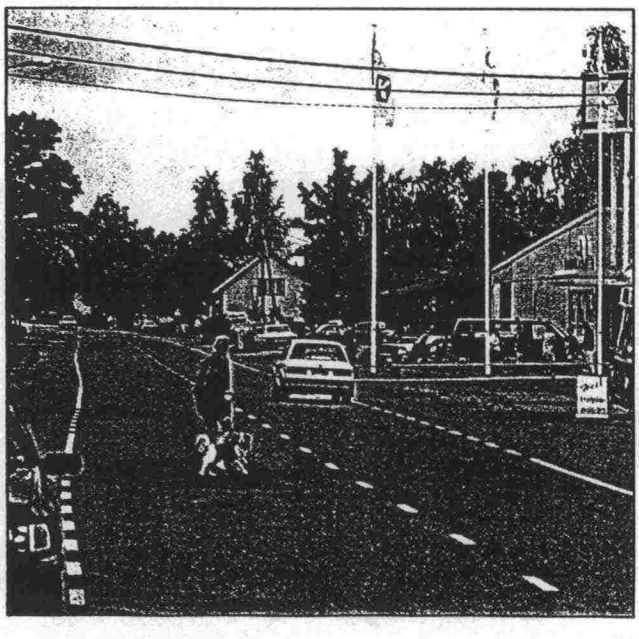
According to recent travel speed measurements in BUA centers, average vehicle speeds are 40 to 50 kph, with maximum speeds of about 70 to 80 kph.

A suitable travel speed for downtown roads is 30 to 40 kph. A hierarchical and correctly proportioned environment helps users to understand the feasibility of a low speed limit, and structural features can be introduced to constrain traffic to the speed limit and reduce maximum speeds.

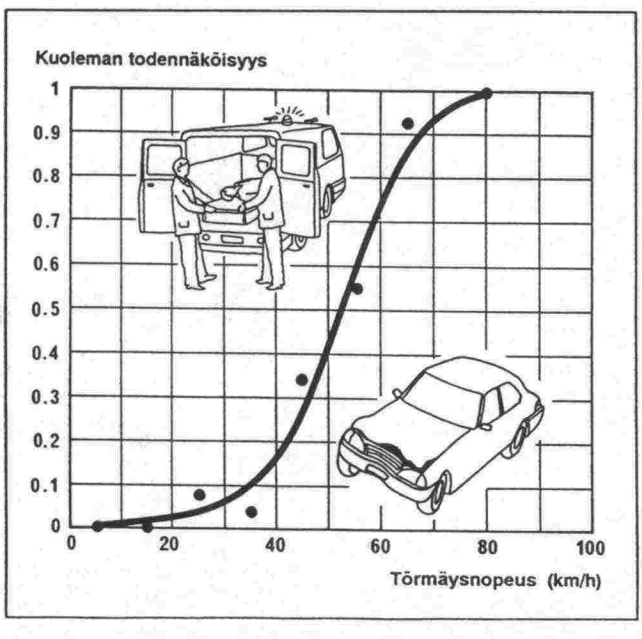
Traffic flow is not usually an important point along downtown roads. It is more important that the road is easy to merge into, cross, and park on. Consequently, it is better that the traffic flow is paced, rather than continuous.

The traffic flow goal can be higher if the road has high status (i.e. if it is a class I or class II main road), if there is much long-distance through traffic, and if the necessary road arrangements can be executed safely.

Channeling on downtown roads is usually not required if the traffic volume is under 10,000 vehicles per day.



5/7. Probability (K) of a pedestrian fatality in an accident as the function of impact speed (Vt).



The throughroad is the most important public space in the community center

A downtown road in a built-up area has an important social function. It is a common 'living room' for all the inhabitants of the municipality, and as such affects the quality of life generally. A downtown road must be a safe, enjoyable, and pleasant place where everyone can move around, shop, and spend their time.

When a throughroad is designed, the behavior of the inhabitants must be taken into account. If a square adjoins the throughroad, it must be placed at the functional focus of the area to make it seem a feasible centerpoint. In many cases, a new and in itself well designed square has been placed, for reasons of land-use policy perhaps, away from the traditional shopping street and has therefore failed to attract interest.

All design work must be based on the movement needs and capacity of all population groups, from children to the elderly and the handicapped. The traffic environment must be designed to make it easy to use also for those that move slowly and have a lower perspective. The traffic and environmental design of a downtown road must reflect the individual character of the area concerned, so that residents can identify with it.

Preserving the small scale, sensitivity, and detail of the environment

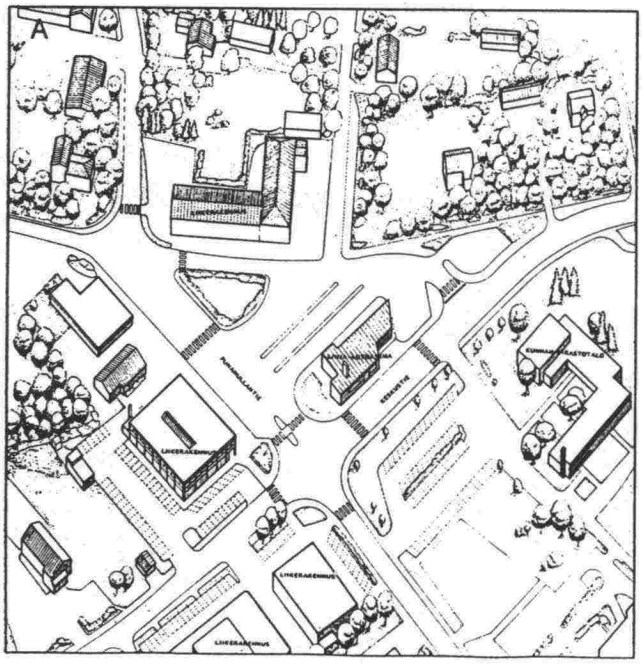
The environment is taken much more carefully into account nowadays than it was in the 1960s and '70s. However, even the best new plans tend to eliminate the small scale and subtle details of the environment, the product of slow evolution, replacing them with coarser features.

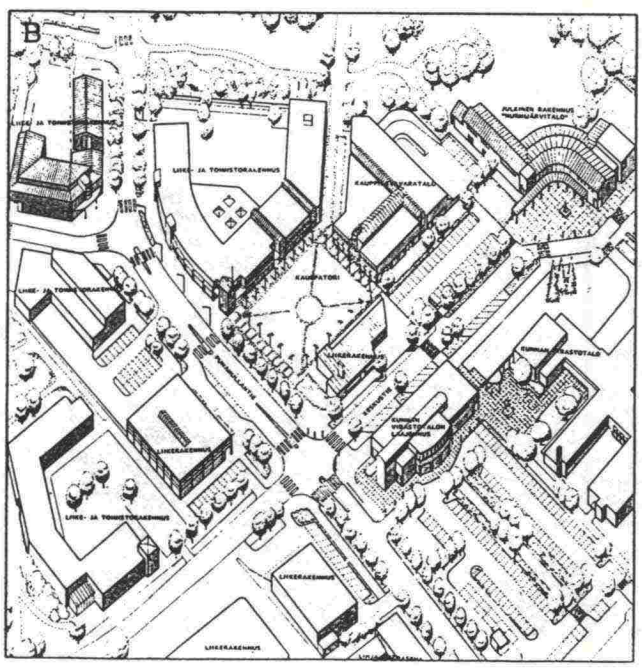
The throughroad design directive issued by the Finnish National Road Administration in 1984 contains an excellent villagescape analysis. The directive also points out the importance of carefully taking stock of the present state of the area, with particular reference to greenery and existing buildings. There is still much to be desired in the way these principles are applied in practice, though.

Some recent throughroad plans, both executed and unexecuted, show that several small alterations in the alignment, vertical alignment and cross-section of the road, and overly radical changes (e.g. extensive tiled areas, plantings that differ greatly from the old environment) transform the environment completely. Removing the small detail causes the throughroad to seem isolated from its environment.

What this comes down to is understanding the features of the environment and integrating them into the basic principles of the design work.

5/8 A-B. An example of a development scheme for the street space in a BUA center. A is the present situation, B the plan. Nurmijärvi, 1987.





Work on site must begin during the planning stage. When the road is tangibly marked out in the terrain at the preliminary stage, the designers and decision-makers can better visualize the extent and quality of the proposed changes.

Integrating the level of a throughroad into its environment

As the result of improvements and road maintenance, the vertical alignment of nearly all throughroads has risen, often so much that it hinders the maintenance of old buildings along the road: raising the road level has left the old buildings in a kind of a ditch.

According to present building plans, most old buildings in built-up areas can be torn down. Furthermore, raising the road level often makes preserving and renovating these buildings technically impossible.

Planning the road's vertical alignment is one of the most important and also one of the most difficult tasks in downtown road layout design. New buildings have already been built according to the level of the improved road; thus, a new road design project must establish case by case how differences in level between the road and buildings of various ages along it should be coped with, and the extent to which the vertical alignment can be fitted into the environment.

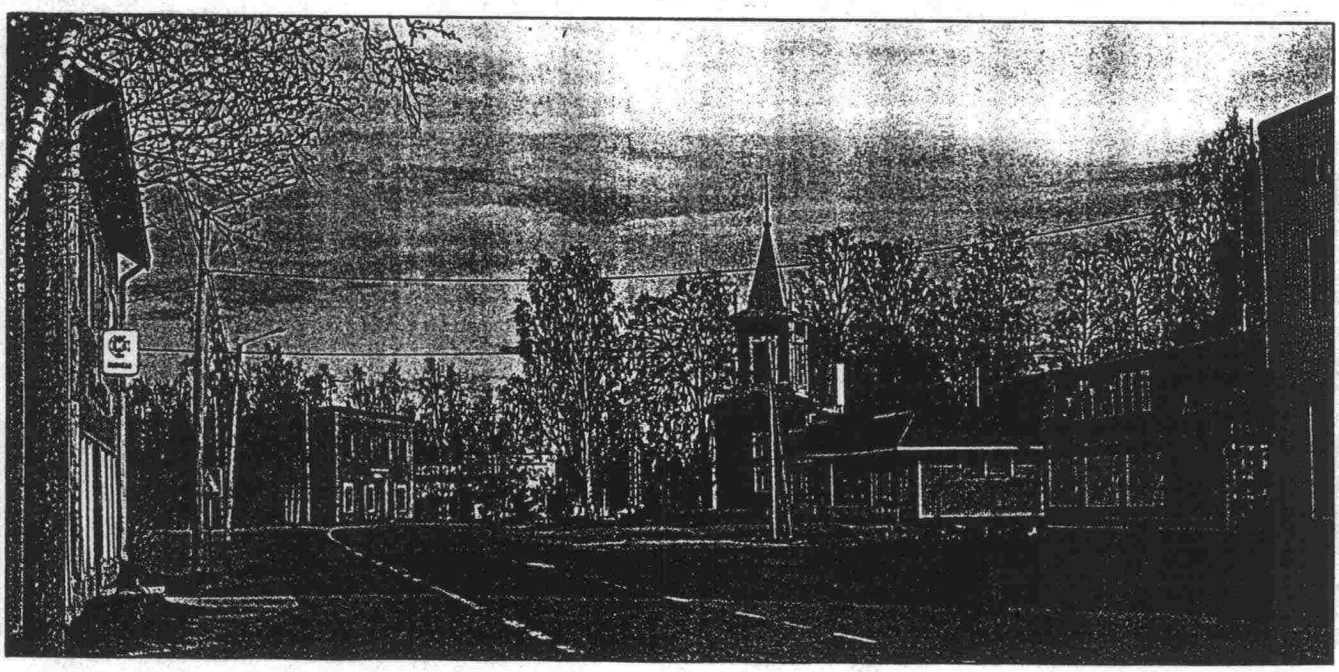
Preserving old buildings

Nearly every old building in a rural built-up area is of the utmost importance to the villagescape.

Old buildings are visual documents of the history of the area and create historical layers in the community structure. Rural built-up areas are comparatively young, but not as lacking in history and interest as the outward appearance of many of them today would seem to indicate.

Old buildings are particularly needed in creating (or segmenting) sections with different characters along throughroads. Broadening road areas and setting buildings far back from the road produces wide and amorphous street spaces. Old buildings close to the road form gateway structures that it would be difficult to create using new construction.

5/9. Preserving old buildings makes a built-up area unique and showcases the history of the area. In a slowly changing area, in particular, all design must be based on existing buildings, whatever their quality. Kortesjärvi in 1992.

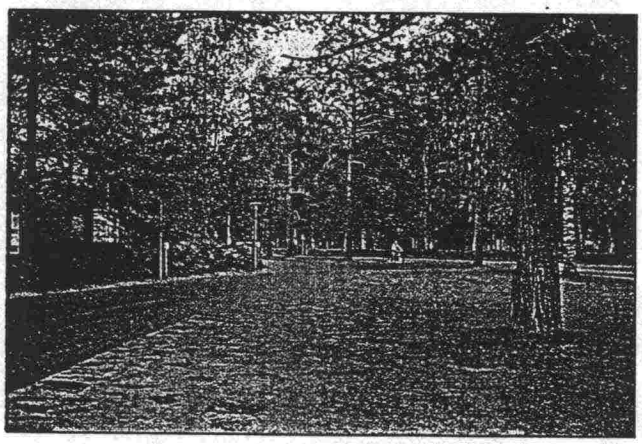


Maintaining and preserving old buildings depends on the attitudes and values of their owners and the municipal authorities. Where there's a will, there has always been a way to find a suitable function, and consequently means for preservation, for old buildings, and in these cases neither zoning nor road construction has prevented preservation and maintenance.

Preserving and developing greenery

Trees are important for the villagescape of a rural built-up area. Traditionally, trees in such areas tend to be in free-standing groups on plots. New plantings are often too geometrically placed.
Rows of trees lining a road may be a good idea in many places, but comprise a design element that is frequently misused today.

Problems are caused by using saplings that are too small and tree types that do not stand up to the local climate or other conditions. Planted trees are often not cared for well.



Developing the road environment

The newest throughroad plans pay great attention to the design and arrangement of concrete paving, street lights, and speed constraints. Often these details do not fit in with the basic villagescape concepts, creating a conflict. One example is the use of multi-colored concrete tiling in a place where gravel would fit in better with the environment. The new throughroad and market square in Multia are a fine example of details that suit a small and spaciously built area.

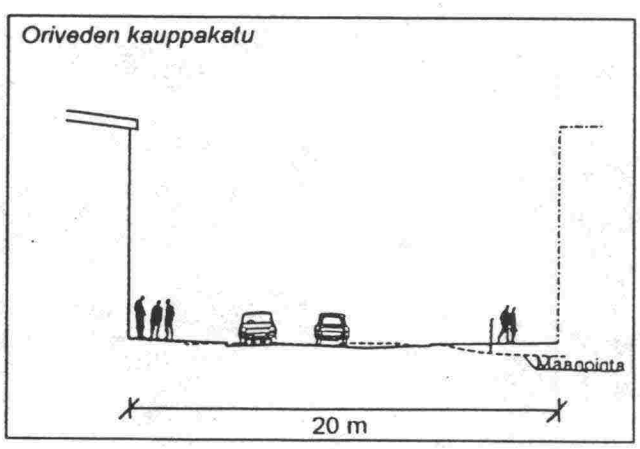
Bus stop shelters, benches, speed humps, and other street furniture are somewhat haphazardly selected at present. Apart from certain market squares and pedestrian streets, they are of poor quality.

The best results in street light and furniture design are achieved with high-quality design concepts that aim at timelessness.

5/10. Here, the quality of the villagescape derives from the greenery. Preserving and developing this greenery is a basic concept in the road plan. Pomarkku.

5/11. A well-executed square in a small rural built-up area.

5/12-13. Examples of cross-sections of downtown roads. The Orivesi shopping street gives the impression of a town-like street space, while in Liminka the street space is too wide and thus highway-like.



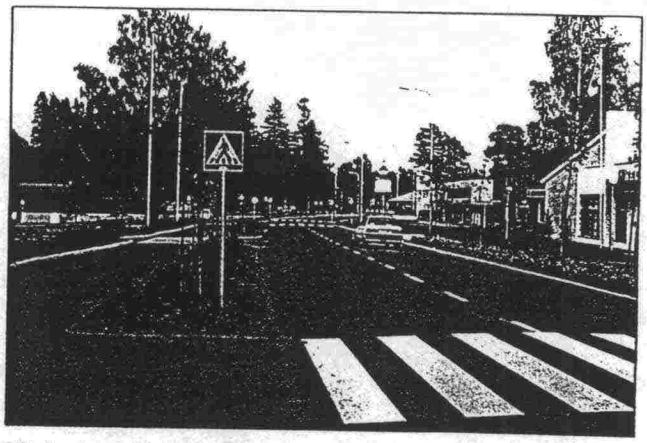
Developing the street space

There are still sections of downtown highroads in many rural built-up areas with street spaces clearly defined by buildings and plants and beautiful rows of buildings. However, the overwhelming majority of downtown shopping streets are, as the result of zoning in the 1960s and '70s, huge, bare sweeps of paving. These shopping streets have no spatial form, and the individual buildings are like islands in a sea of parking lots.

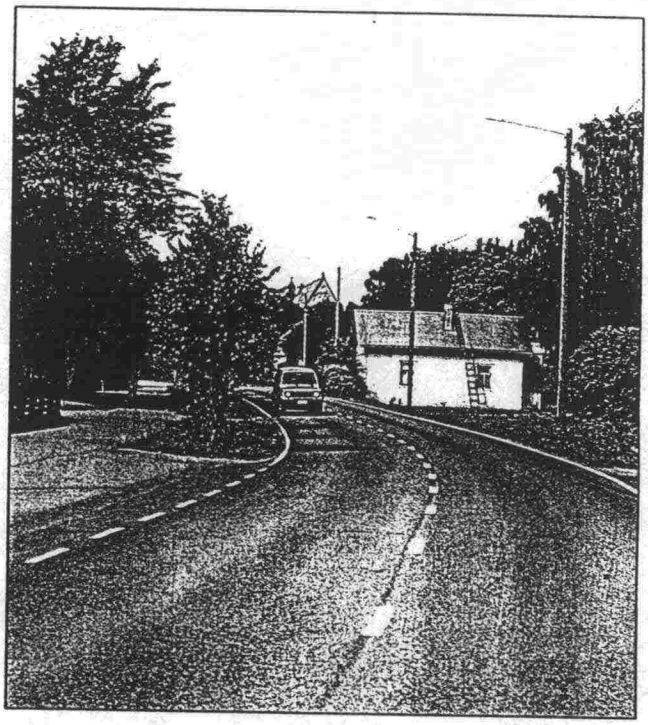
Unfortunately, even the newest business construction principles seem to support disruption of the street space. Buildings are preferably placed in the middle of their plots and hence amid parking or on the back line of their plots. Some examples of business and office buildings helping to delimit the street space were observed during the field trips, though.

It is essential to preserve existing delimited street spaces in center zoning and traffic design. Villagescape analysis can be used to determine the principles for street space creation on each section of the road. The present street space can be retained on sections that are spatially delimited. Long open stretches can be segmented with gateway structures, such as new buildings, plantings or technical means, but above all old buildings.

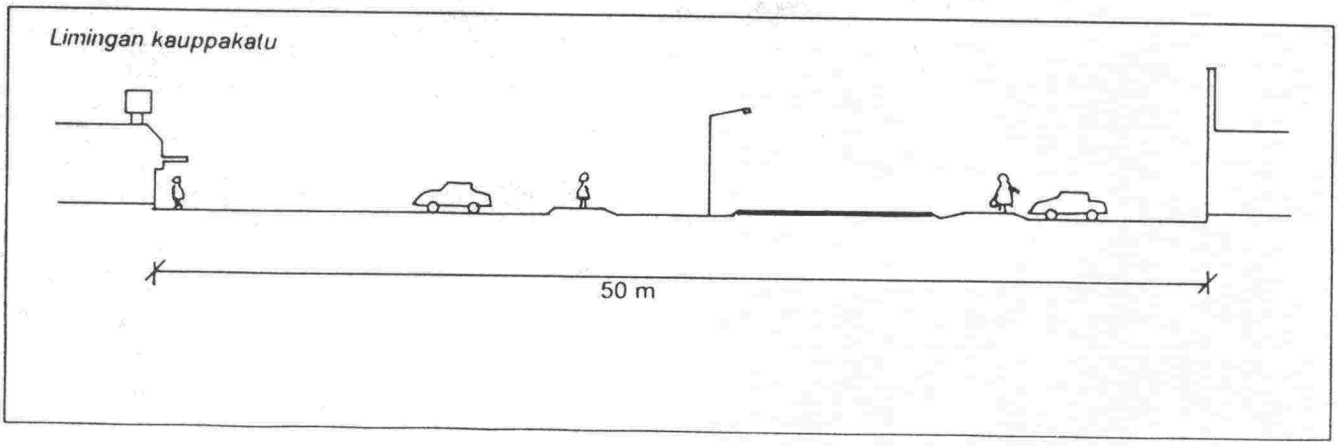
The placement of parking lots helps to delimit street space. Extensive parking areas in front of stores, and parallel roads generated by these parking areas should be avoided.

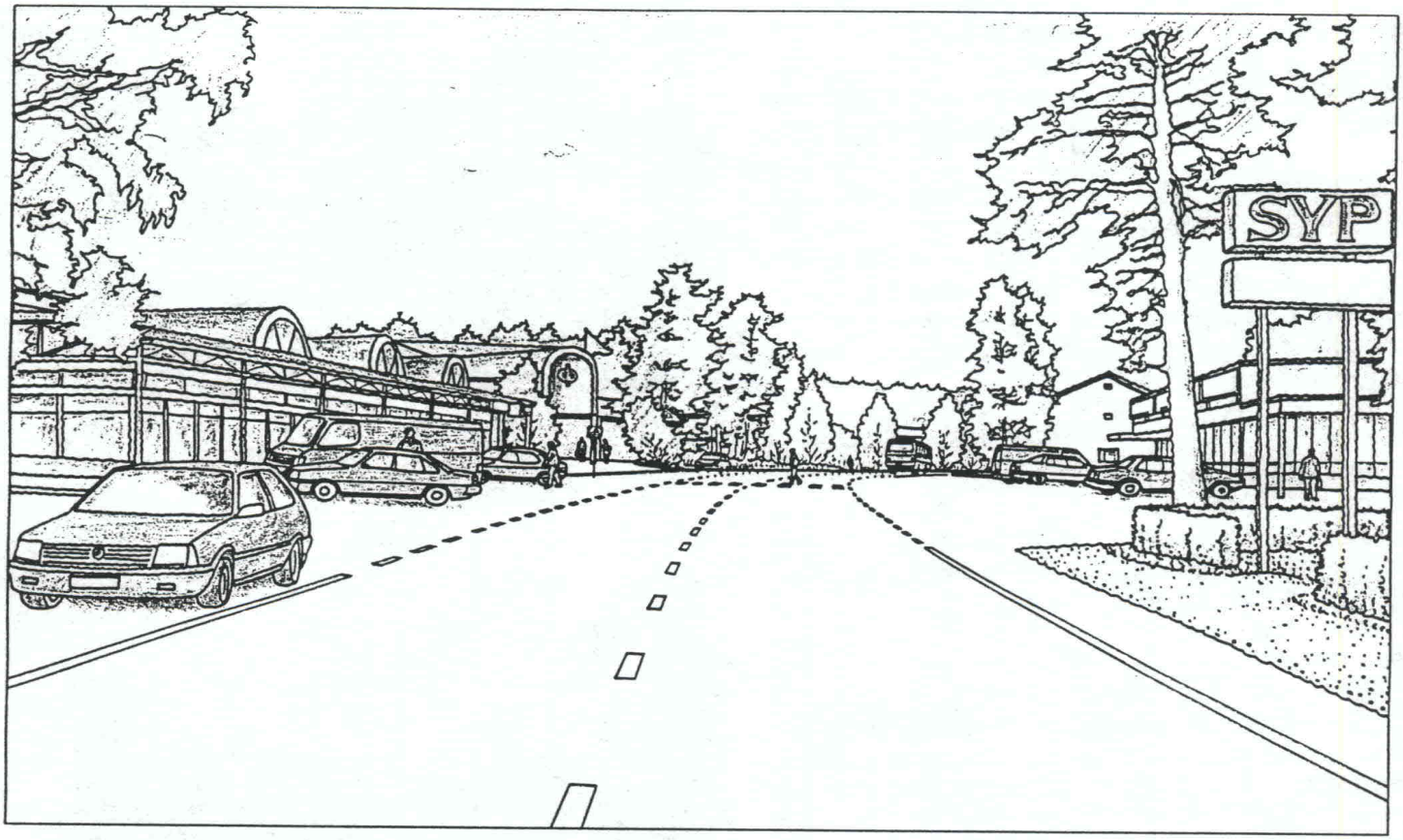


5/14. A well-managed and uniformly constructed road environment makes for a balanced villagescape. Elimäki.



5/15. A clearly visible built-up area boundary, with the church gable as the end point, offer the zoning planner and road designer a good starting point for developing an interesting road environment

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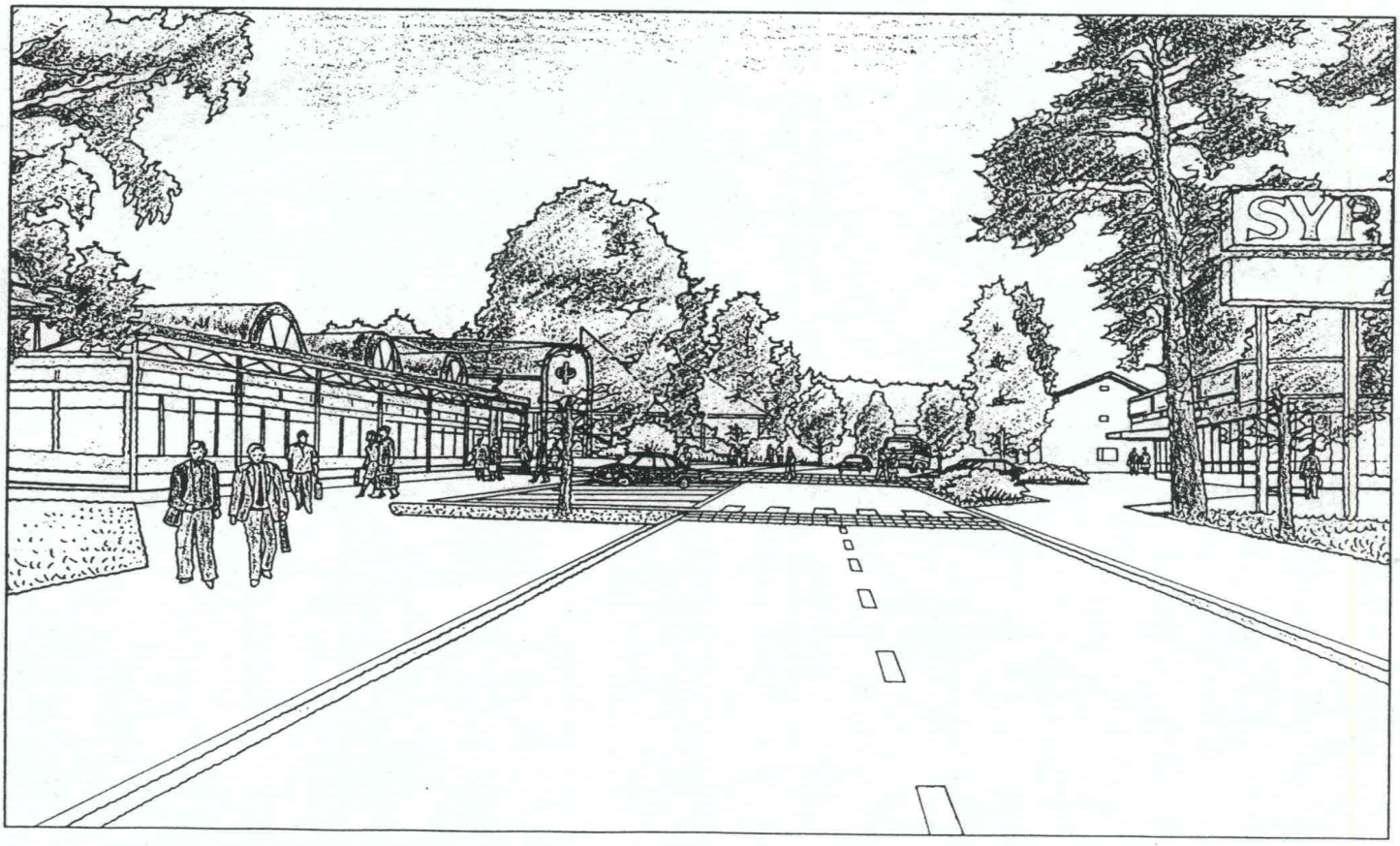
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6 DEVELOPING THROUGHROADS

This section describes the design tools and methods with which the development needs discussed in section 5 can be met.

6.1 The throughroad design process

More cooperation between zoning and road layout design

Throughroad improvement nearly always means altering the building plan. On the other hand, a throughroad can be integrated with its environment only if a sufficiently extensive environmental scheme is included in the design work. Thus, throughroad improvement design must be based on simultaneous municipal land-use and environmental planning.

The throughroad examples examined for this project show that a better result in terms of both road design and villagescape would have been achieved had the town plan been designed and amended as a comprehensive entity instead of through random improvements. In many cases, the zoning alterations have been seen merely as points in the road plan checklist, no thought being given to the content of the town plan. Naturally, land-use and environmental planning require more resources than merely amending the town plan. However, road improvement is a major investment for any built-up area, and as such should be supported by zoning. The effect of road investments on land use is greatest when the zoning is done appropriately.

Before design work on the throughroad begins, the municipal authorities must be contacted to establish the zoning status of the center and other areas immediately adjacent to the road. The municipal zoning officials must be consulted on practical points of cooperation, including schedules, organizing actual cooperation, and division of labor (e.g. environmental inventories).

Other experts can be involved in the planning work, such as provincial environmental collaboration groups. These experts can be used, for example, in the beginning of the design process to estimate the needs and aims of the work.

The changes now being implemented in the building legislation increase the importance of local decision-making and emphasize the need for closer cooperation. Thus, the various parties must agree on their vision of the future of the road network and different road sections.

Planning phases

The road network plan in the built-up area's master plan shows the structure of the motor-vehicle and bike and pedestrian traffic network as a part of the area structure. The purpose of the road network plan is to establish the principles according to which the road network will be developed and the character of the throughroad on which the general scheme for the road will be drawn up.

The basic premises for throughroad design are identified problems in traffic safety, traffic service level, the villagescape or the environment. The decision to create a development scheme for the entire throughroad or only to implement corrective measures should be baed on the scale of these problems.

Throughroad improvement design begins with drawing up a general scheme. In the general scheme, the different development alternatives are examined in parallel with land-use planning. All the basic decisions on traffic arrangements, as well as any land use solutions linked with them, are made in the general plan. Technical designs are examined only to check that they are feasible and that their costs and other effects can be studied.

The technical plans required for actual road construction are made in the final engineering plan.

The general scheme contains at least the drawings mentioned in the relevant official directive. The presentation of this plan is further discussed in section 6.6.

The general scheme is submitted for opinions as required and updated if necessary.

The drafting of a general scheme begins by preparing a comprehensive analysis of the present road state, on the basis of which the real present problems and goals can be established.

The analysis should cover:

* Land use and functional structure
- present structure and shortcomings in it
- the functions and the need for links between them
- center point of the built-up area
- realistic estimate of growth rate and potential for change

* Villagescape
- originality of the environment
- positive features of the environment
- problems requiring correction
- sites to be preserved, constraints on land-use alterations and road design imposed by the environment

* Road network
- the status of the road in the national network and the area network
- speed level goals in different parts of the road network
- road network history
- road network development aims

* Traffic
- traffic function
- traffic safety situation
- functional goals

The throughroad is segmented for further planning on the basis of the present-state analysis.

The phases of planning can be shown as in Figure 6/3.

Open planning

Throughroad design must be an open process in the sense that not only landowners but also other residents and road users can express their opinions on both the goals and the proposed designs.

In finding solutions to existing problems, it is a good idea to cooperate with the residents, road users and business, and traffic professionals, for example, by sending questionnaires to households and stores in the area. The views of different groups of road users can be examined through specially targeted questionnaires. These questionnaires provide information not only on the present problems but on the wishes and ideas of the various groups regarding different sites.

The environmental constraints (such as protected sites) should be investigated in cooperation with various authorities (the Ministry of the Environment, the provincial governments, the Regional Planning Associations, the National Board of Antiquities, the municipality, etc.).

Throughroad design, from present-state analysis to the detailed execution of the individual design concepts, requires close cooperation, above all between land-use planning, villagescape expertise, and traffic planning expertise. It is particularly important to establish dialogue between municipal zoning and road planning so that the municipality and the Finnish National Road Administration can combine their efforts to determine the present problems, development goals, and design concepts of the built-up area and the throughroad.

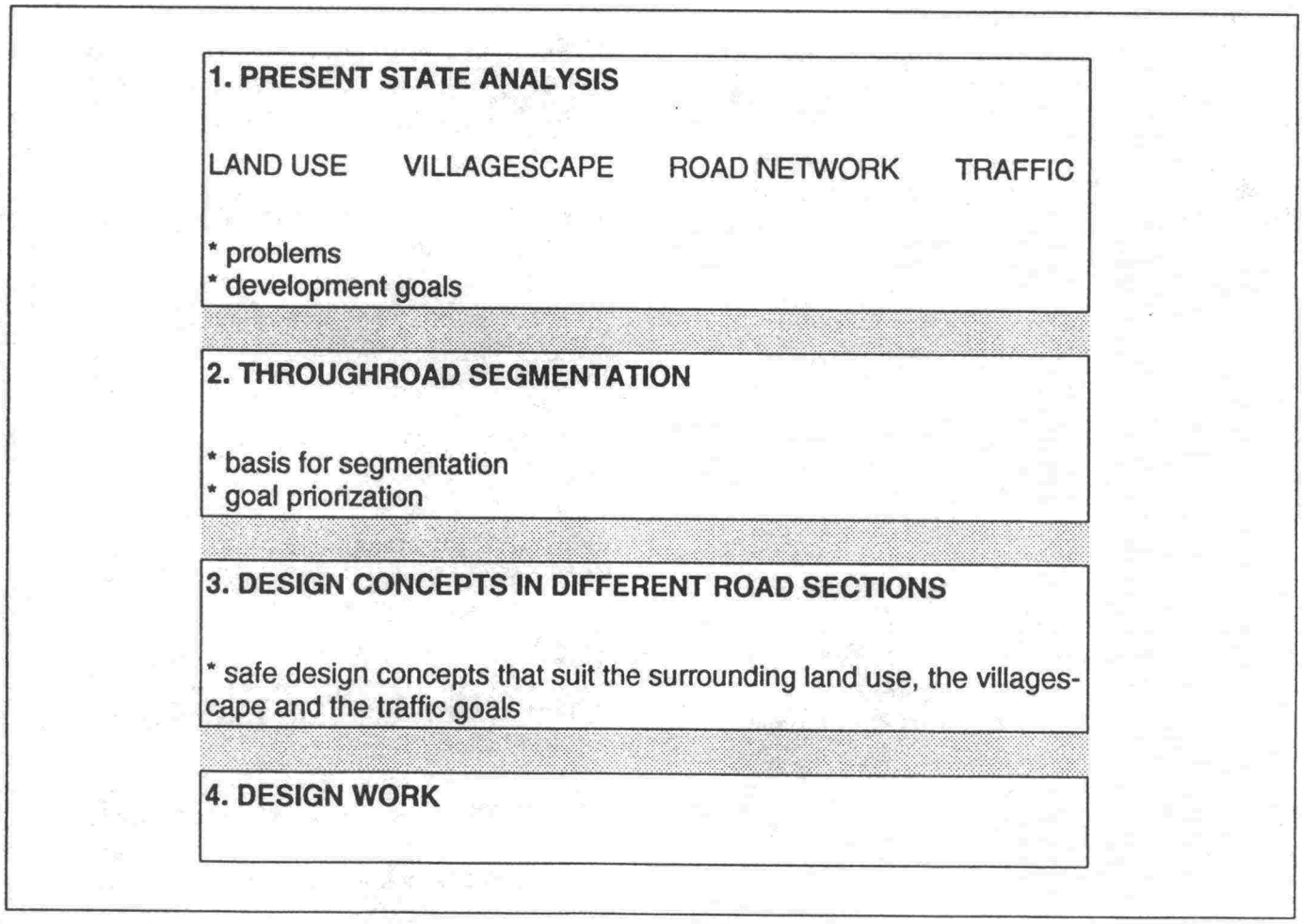
'Open house' days can be organized during the planning process to enable residents and other interested parties to express their opinions, in person or in writing. Suitable themes for an open house session might be:

- present problems and development goals
- preliminary design concepts
- developed design concepts and alternative comparisons
- final adjustments to design concepts

Theme days for local businesses are also worthwhile, in addition to open house days for the general public.

Managing an open planning process is very difficult, compared with the conventional expert design process. The planner may find that there is no single clear opinion to support his work; rather, the various parties may even give use to conflicts that prove irreconcilable.

The purpose of the open planning process is to find the social factors affecting throughroad design. The idea is to obtain information on how the traffic environment is experienced, thus taking the viewpoint of local residents as a basis for planning. The end result is a throughroad that fulfills not only common needs but the separate needs of each group.



6/3. The phases of throughroad planning.

6.2 Present-state analysis and design goals

Present-state analysis examines the design principles, related problems and development goals.

6.2.1 Functional structure and land use of the built-up area

The purpose of a downtown road plan is to support the existing functional structure of the area and to solve functional problems.

The purpose of the road design is to preserve the unique character of the area, for example in a village with a highroad, by preserving and supporting features typical of the highroad.

Fitting road design and land-use planning together

The starting point for road design is to determine the existing functional structure of the built-up area, related problems and development needs, thus defining the function of the throughroad as a component in the structure of the whole area. This requires that the land use and road network of the built-up area be examined at the master plan level before the detailed planning work begins.

If there is a fairly recent component master plan or other comparable plan in existence for the municipality, it can be used as a basis for planning. However, the land use planner and the traffic planner should always make sure that their zoning information is up to date.

Things that must be examined at the level of the individual area are existing services and other functions that the throughroad must serve and that generate traffic. Furthermore, the function of the throughroad in the wider network and locally is defined, and problems and improvement needs related to the functional structure are examined. Such questions may include the following:

- need for links between functions and the relationship of the functions to the traffic network
- pedestrian safety (cross-street routes)
- functional focus of the built-up area, the market square
- assessment of the speed of change in the area, projecting a timetable for executing the plan.

6.2.2 Villagescape

A villagescape may be defined thus: "What we usually call villagescape is the visible entity formed by the buildings and the natural environment of the built-up area" (Kekkonen Ahti and Kukkonen Heikki, 1991).

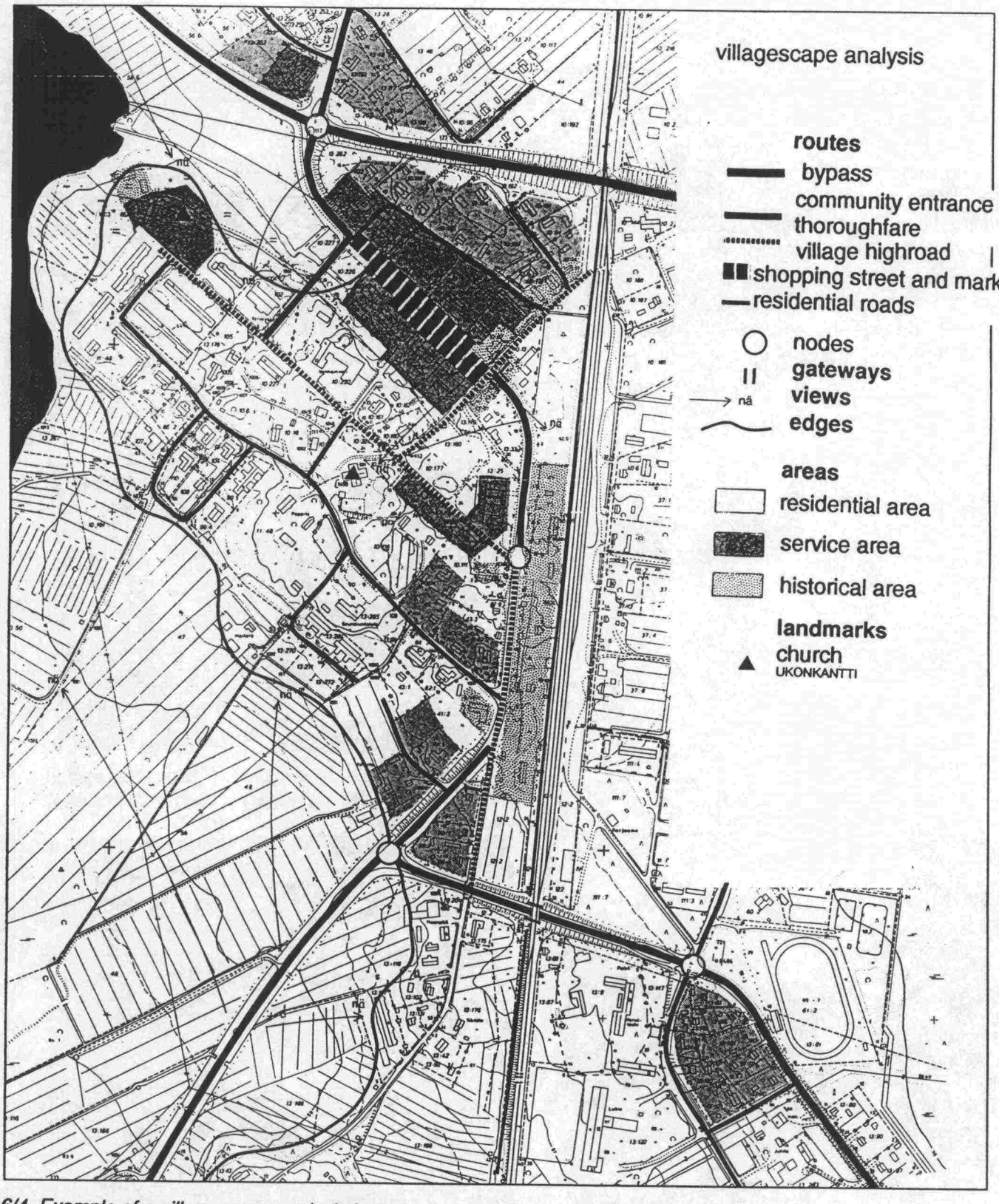
The aim of the environment-conscious throughroad plan is to preserve and develop the positive and valuable aspects of the villagescape.

The villagescape analysis prepared for the road plan must establish the positive features of the environment adjoining the throughroad. These include:

- buildings important for the villagescape (historically valuable buildings, delimiting gateway buildings and buildings important for the character of the environment)
- characteristic features of the road environment (e.g. small-scale geometry of the road)
- landscape features such as cliffs, ridges, brooks
- views
- details such as stone walls
- greenery (the analysis should also point out the species of vegetation and the importance of preserving it)

The analysis should also list shortcomings requiring correction, such as:

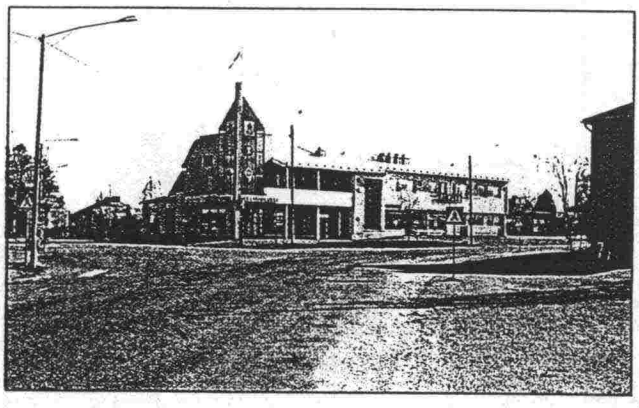
- elevated road level, the most important of the problems directly related to road construction; the points where lowering the road level would be necessary should be listed



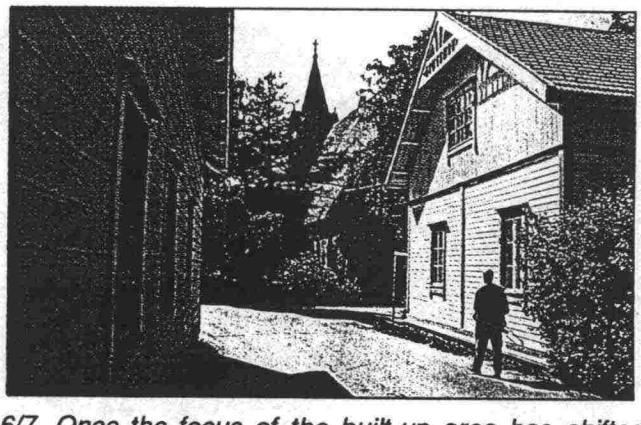
6/4. Example of a villagescape analysis in a small rural built-up area. Vihanti.

- unnecessarily wide road areas, weak space formation
- opportunities for opening up and improving views
- greenery management

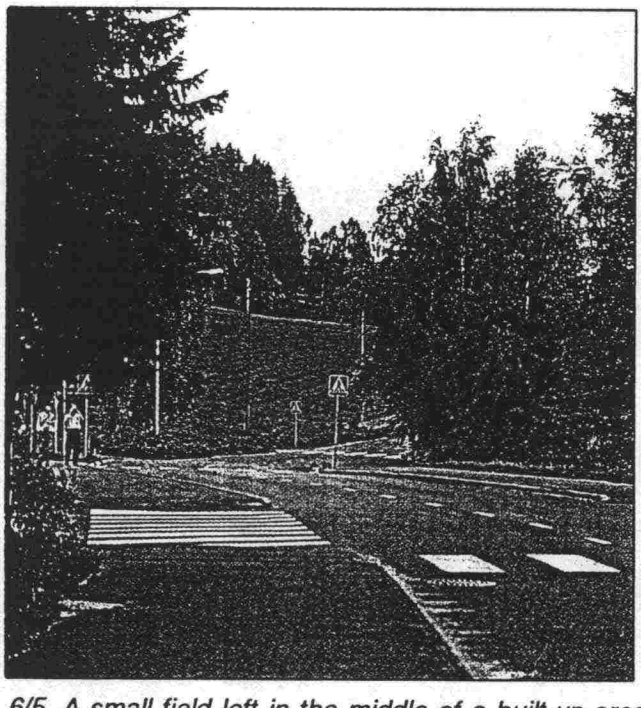
The results of the analysis are published in the plan report. The development aims for the villagescape are determined on the basis of the villagescape analysis. The conclusions drawn for planning purposes should be examined in cooperation with the zoning authority.



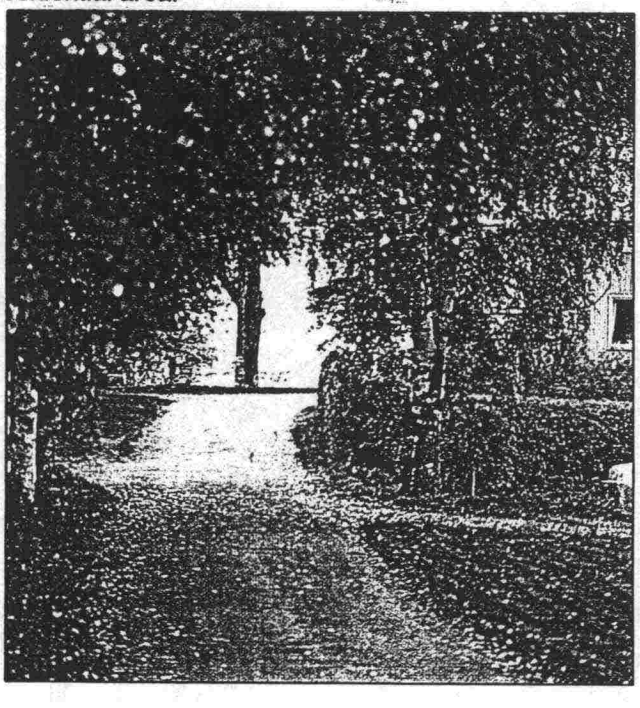
6/6. A major intersection is often the natural focal point of a built-up area. Lappajärvi.



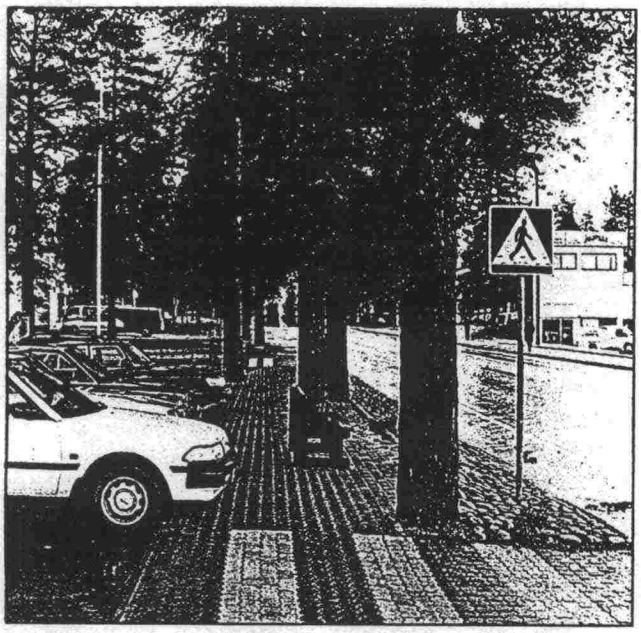
6/7. Once the focus of the built-up area has shifted away, the old focal point has become a pleasant residential area.



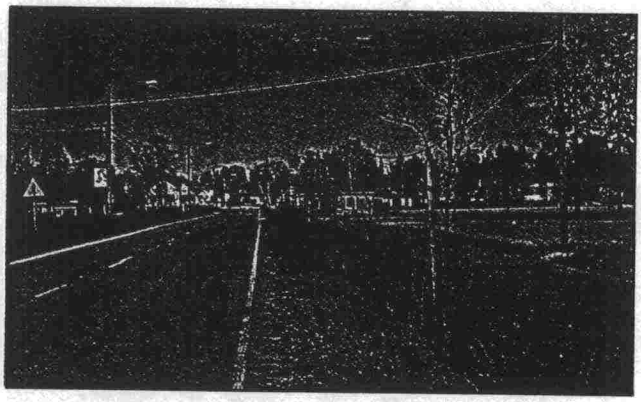
6/5. A small field left in the middle of a built-up area; the long view across the field helps the traveler to see how the area fits into the landscape. Heinävesi.



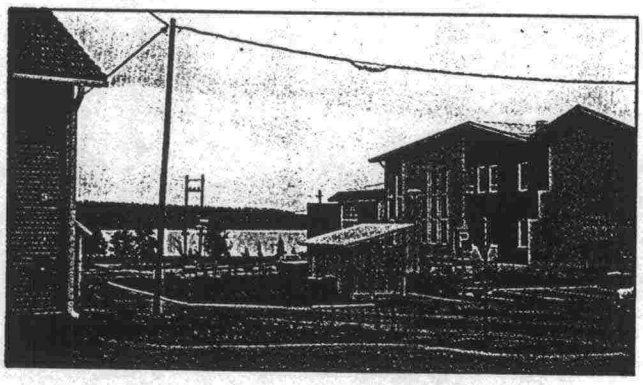
6/8. Buildings, landscapes, and views important to the villagescape should be preserved. Sumiainen.



6/9. A precise inventory of existing vegetation makes it possible to take trees important to the villagescape into account even in detail-level design. Sonkajärvi.



6/10. If buildings form a clear edge to the built-up area, this edge should be emphasized in the road design, too.



6/11. The last view of the lake from the village highroad is being closed off as the trees planted in the parking lot grow. Rantasalmi.

6.2.3 Road network

Most built-up areas have a road network plan that lists the development goals. The road network plan can be updated at the beginning of the design process if necessary.

In the present-state analysis, the status of the road in the national and local networks is defined. Suitable speed levels can be determined for different road sections on the basis of the network analyser and the traffic safety situation.

The speed level and other goals in old road network plans should be revised to match present views.

The national network

In the national network, the throughroad is usually a secondary road or a regional road. In Northern Finland in particular, throughroads can also be class II major roads (Kittilä, Sotkamo) and class I major roads (Sodankylä, Muhos).

The BUA road network

Throughroads within the BUA road network can be divided according to their traffic function as follows:

*** thoroughfare**

- the shopping street section of the thoroughfare serves shoppers and private businesses, the stores being directly adjacent to the throughroad
- the rest of the downtown thoroughfare is unrelated to the land use of the service center: access to stores is via zoned roads, or then the service center lies along a zoned road

*** center approach road**

- leads to the shopping street or changes into a shopping street in the center
- serves traffic from the fringes of the built-up area and from outside the area to the center; directly related to land use since plots are adjacent to the road

*** center bypass**

- built to replace the center thoroughfare; bypasses the service center but not the entire area.

Speed levels

The status of a road in the road network is one component in determining its speed level. Speed level is one of the most crucial traffic factors in throughroad design, since it provides the framework for technical design and thus for the quality of the road environment.

The most feasible speed limit for downtown shopping streets, taking both traffic safety and smooth functioning into account, is 40 kph, irrespective of road classification; 30 kph is also possible. A low speed limit reduces the adverse effects of through traffic on the area (noise, lack of traffic safety, etc.), thus reducing the need for a bypass.

Higher speed limits are possible on other center thoroughfares and approach roads (50 kph) and on center bypass roads (60 kph), land use and traffic safety permitting.

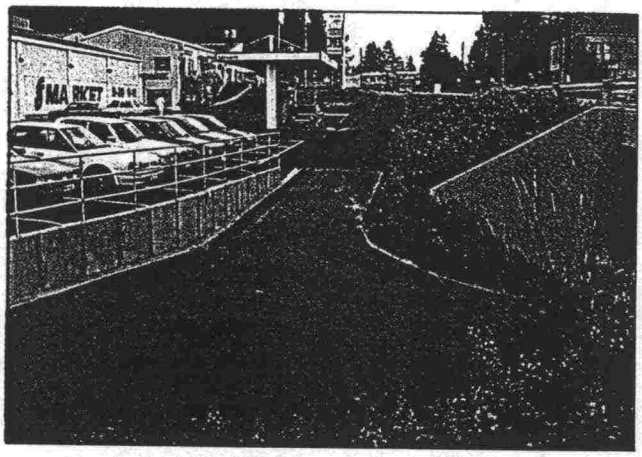
Roads completely bypassing the built-up area can have a speed limit of 80 kph, provided this does not lead to problems with traffic noise.

Placement of functions in the road network

The placement of local functions of the area (e.g. schools, health center, old folk's homes, bus depot, industrial buildings) and their relationship to motor-vehicle traffic and bike and pedestrian traffic networks must be charted to establish the pedestrian and bicycle traffic flow both across and along the throughroad, as well as other traffic on the throughroad (e.g. industrial transportation, agricultural traffic, etc.). This enables throughroad problems (such as heavy through traffic) to be solved through network design.

History of the throughroad

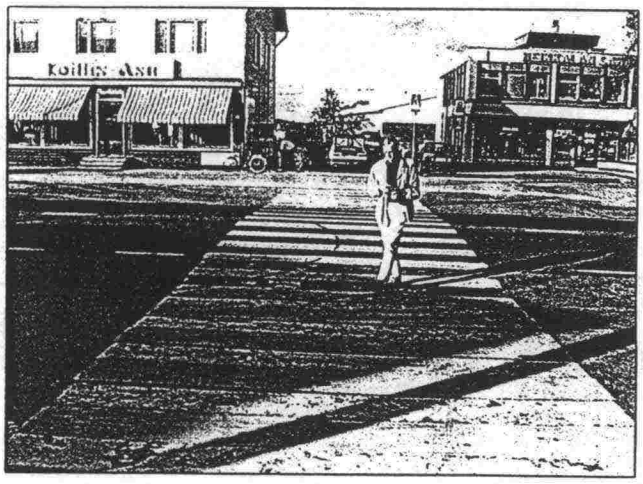
In addition to the present state of the road network, the history of the road network overall and the throughroad in particular must be surveyed so that old preserved environmental elements and sections of road can be taken into account in the design process.



6/12. Placement of functions must be established when the road network is planned. This picture shows how the stores and services constructed on either side of the road have been cut off from a new downtown road elevated on an embankment. Kerimäki.

6.2.4 Traffic

The present-state analysis should establish the traffic function of the throughroad as well as its traffic problems, which may involve traffic safety, smooth functioning of motor-vehicle or bike and pedestrian traffic, or special conditions required for parking, mass transit, service traffic or special user groups.



6/13. The status of bike and pedestrian traffic must be improved. Simply marking a crosswalk is not adequate. Kuusamo.

Traffic function

The traffic function of a throughroad, i.e. the amounts and character of its traffic, can be determined on the basis of traffic volume, the proportion of through traffic and the make-up of the traffic. Traffic function in turn affects the functionality goals. In determining speed level, the status of the road in the road network and the land use in areas immediately adjacent to the road should be considered.

Traffic safety

The traffic safety situation should be examined as closely as possible. The safety of both parallel and crossing bike and pedestrian traffic (along and across the throughroad) should be considered. Statistics on traffic accidents reported to the police give an overall impression of the safety situation. However, a great many bike and pedestrian traffic accidents are never reported (single accidents involving bicylists, skids, etc.). Health centers may be approached to obtain more exact data if required. Statistical reports based on a more extensive material can also make it easier to identify the effects of various factors on the BUA traffic safety situation in the area. Once the overall conditions are known, accident risks can be estimated.

Statistics do not report the feelings of insecurity experienced by residents, nor at what age parents consider it safe to allow a child to walk or bicycle alone in the center. Interviews can be used to find out about this sort of thing, as well as the factors behind such feelings of insecurity and the locations that are perceived as the most dangerous.

In examining motor traffic safety, attention should be focused on PIF accidents, of which about 60% are reported to the police. Over 60% of all motor-vehicle accidents in built-up areas occur at intersections.

Functionality

Traffic functionality goals can be set once the traffic function and network status of the throughroad are known. The functionality of traffic on the throughroad and traffic merging into it should be examined separately.

In the shopping street, which mainly serves internal traffic in the built-up area, easy merging into the throughroad is more important than an uninterrupted flow on the throughroad, from the point of view of good functioning on the shopping street. The traffic flow should be relatively slow and interrupted; this is also conducive to increased safety. The smooth functioning of motor traffic does not conflict with parking along the traveled way or a high number of local driveway intersections along a section of shopping street.

If the road being examined is a center bypass carrying a lot of through traffic, uninterrupted traffic flow is more important, and thus parking along the traveled way should be avoided, the number of local driveway intersections should be minimizes and the major zoned road intersections should be channeled.

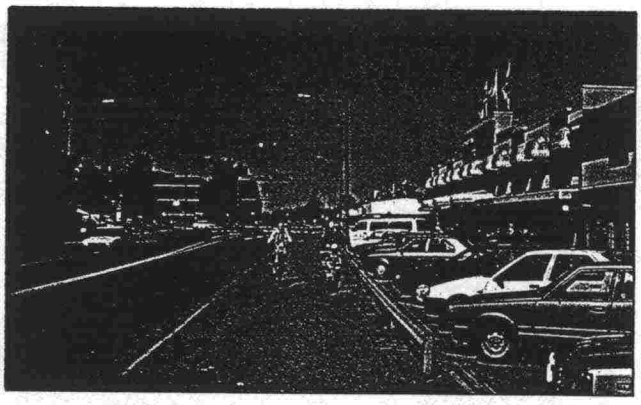
Other factors to consider in throughroad design are special situations such as the probability of encountering an oversized vehicle. The service level in such a situation must be defined (e.g. one of the vehicles must stop, passing is only possible at certain places, what the speed level is when passing, etc.).

The smooth functioning of delivery and service traffic and mass transit is an essential part of the functionality of a shopping street. The present-state analysis examines related problems by observing traffic activities and by interviewing professional drivers.

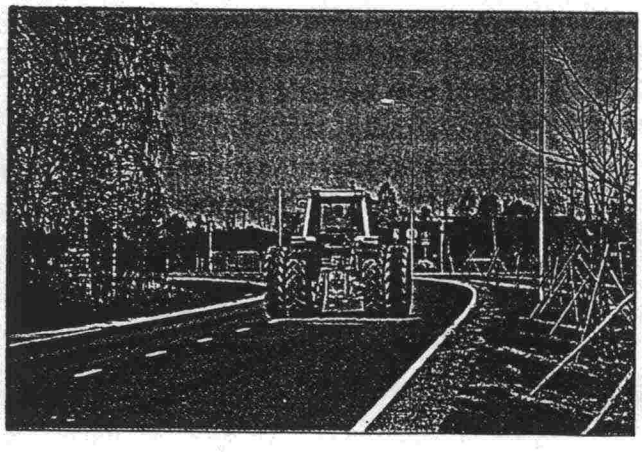
Bike and pedestrian traffic must be provided with continuous safe routes in a pleasant environment that are easy to use. The function of the central highroad as a meeting place should also be taken into account when designing the bike and pedestrian traffic system.

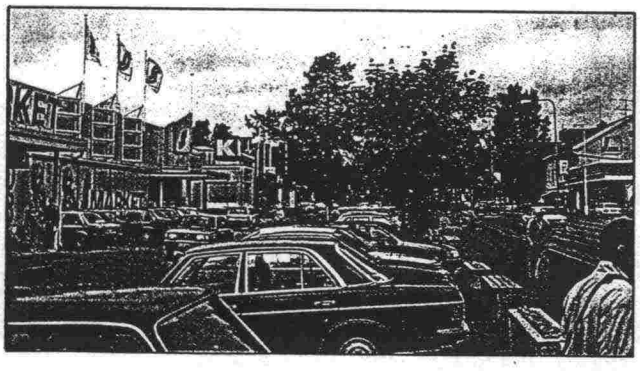
Parking

Parking often occupies a central position in throughroad design. The present-state analysis should contain a parking study to establish the present parking space situation and the need for further facilities and to estimate developments as proposed zoning plans are implemented.



6/14. Highway-like traffic segregators conflict with the demands made of a shopping street. Highway 22 in the center of Muhos.





6.3 Throughroad segmentation

6.3.1 Segmentation principles

A throughroad consists of separate, discrete sections. It begins with an approach section, often followed by a section where construction is denser before the shopping street section, in which all buildings adjoin the traveled way directly. The character of the traffic in each of these sections is defined by the functions along the road section and its status in the road network. Thus, a section of a throughroad is examined from the point of view of both environmental properties and traffic properties.

Throughroad segmentation is a design tool for finding planning concepts that suit the functional structure of the built-up area and the villagescape. The purpose of segmentation is to make it easier to pinpoint the development goals for each road section and to find solutions to traffic problems while taking environmental factors into account.

A section should be defined as a stretch of road in which the problems and the properties of the road and its environment are fairly constant. When any of these change, a new section should be defined.

Road sections should be defined to allow different design principles to be applied in different sections. For example, it is important to provide the shopping street section with bike and pedestrian traffic crossings that are easy and safe to use, parking facilities, and service traffic access. On the other hand, in the approach section the main objective may be to reduce vehicle speeds on the approach to the shopping street section and to develop the landscape. Safe bike and pedestrian traffic routes along the road are also important in approach sections.

The throughroad sections are defined at the goalsetting stage of design on the basis of inventories and problem analyses. Segmentation helps make the goals of the throughroad plan tangible. The road plan draft and the means included in it can also be assessed with the aid of segmentation.

A plan based on correct segmentation and environmental considerations will also help travelers to orient themselves in the area.

6.3.2 Design principles for different sections

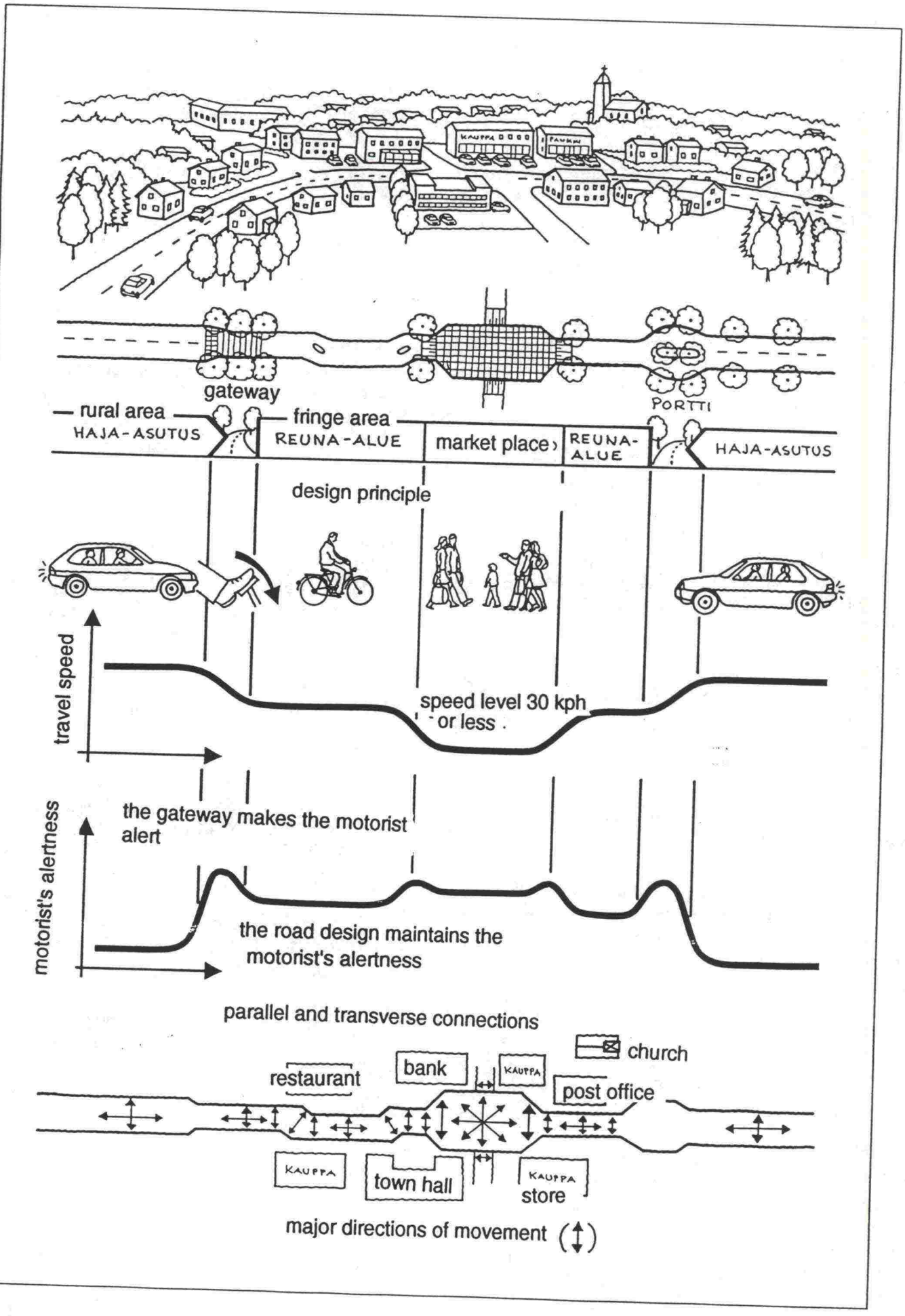
The design concepts used in each section should be based on its traffic goals and environmental properties. Two shopping street sections in different built-up areas, though identical in function and status, may differ greatly in spatial delimitation and scale. These properties crucially affect the form of the road. However, the main rule is that the more densely an environment is built up, the more urban the feasible design concepts are.

Particular care must be taken with historically valuable and homogeneous environments. Such environments are rare in Finnish rural built-up areas. Solutions that would be commonplace elsewhere must be considered very carefully in such areas.

Although segmentation is a useful tool in finding the concepts best suited to the environment and the needs of the traffic, throughroad design should also aim at preserving the continuity of the road. The changes in the road environment and the justification for the various road design features must be evident to the road user. The road must allow easy and uninhibited movement throughout the day and the year.

At the boundaries between sections, design work should make use of environmental features and technical means of traffic guidance.

Every built-up area is an individual. Thus, the specimen sections described in the following are merely sketched out.


gateway
PORTTI
rural area
HAJA-ASUTUS
fringe area
REUNA-ALUE
market place
REUNA-ALUE
HAJA-ASUTUS
design principle
travel speed
speed level 30 kph
or less
motorist's alertness
the gateway makes the motorist alert
the road design maintains the motorist's alertness
parallel and transverse connections
church
restaurant
bank
KAUPPA
post office
KAUPPA
town hall
KAUPPA
store
major directions of movement

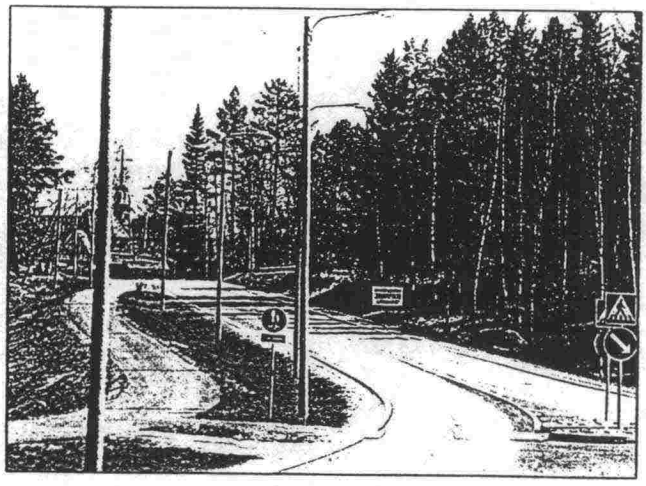
Approach section

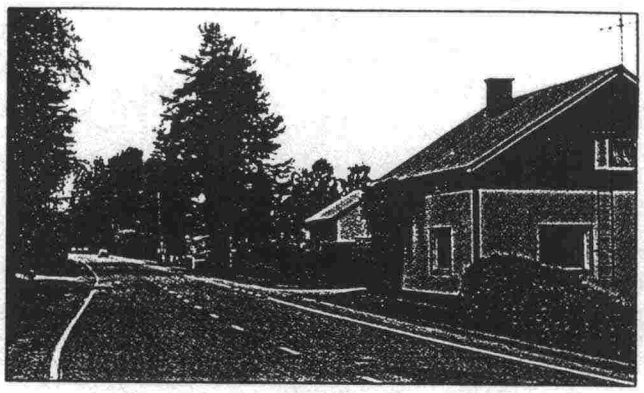
Every built-up area has an approach section, which is typically independent of the surrounding land use, at least visually. However, it is often an access street in traffic function, i.e. there may be several driveway intersections. Many built-up areas have fairly new approach sections, constructed in connection with recent bypass projects.

Depending on the villagescape, approach sections may vary greatly, ranging from highways in free terrain to city-like tree-lined boulevards. The road design means must be chosen to suit the character of the approach section: urban design concepts that are applicable to a citylike boulevard cannot be used in a highway-like approach section.

At present, uninterrupted traffic flow is the dominant characteristic of approach sections. Improvement plans usually aim at moderating vehicle speeds and at improving the safety of bike and pedestrian traffic along the road. A separate bike and pedestrian traffic route is often a good solution, also for the environment.

Since the buildings along the approach section are usually pulled back from the road and the planting on the plots dominates the road environment, the constraints built should feature highly visible large-scale features such as crosswalk islands with planting. Road narrowing with bollards, curbstones or similar measures should be viewed with caution, especially if the environment is not conducive to such structures and the approaching traffic has not been previously warned that it is reaching a built-up area by means of some larger-scale constraint.





6/18-19. Community entrance roads. Närpiö, Rantasalmi.

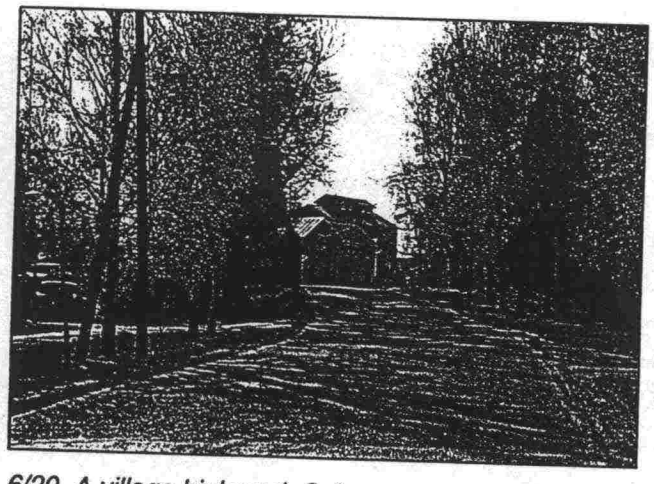
6/17. A segmentation diagram.

The village highroad

The traditional village highroad is a spacious road area; most buildings are freely sited on their plots, and the road environment is dominated by planting. If there are business buildings adjoining the road, they are individual occurrences and do not form blocks as on a church village highroad. The scale of the road and its environment is small.

Traffic volumes are usually so low that they need not be considered when road design plans are drafted. However, earlier improvements may have made the road geometry so streamlined that vehicle speeds are quite high. It is important to consider any parallel bike and pedestrian traffic, since a road section like this is usually part of a linear model built-up area.

Urban technical features such as bollards should be used with caution. All designs should harmonize with the environment; for example, all constraints should be built using elements already present in the environment. A regular median with trees between the road and the bike and pedestrian traffic path is an element alien to the terrain-linked village highroad. A separate bike and pedestrian traffic route is likewise out of place in the traditional church square. The best surface materials in the village highroad section are grass, gravel, asphalt, and light aggregate materials, perhaps also natural stone in connection with important buildings.



6/20. A village highroad. Sulva.

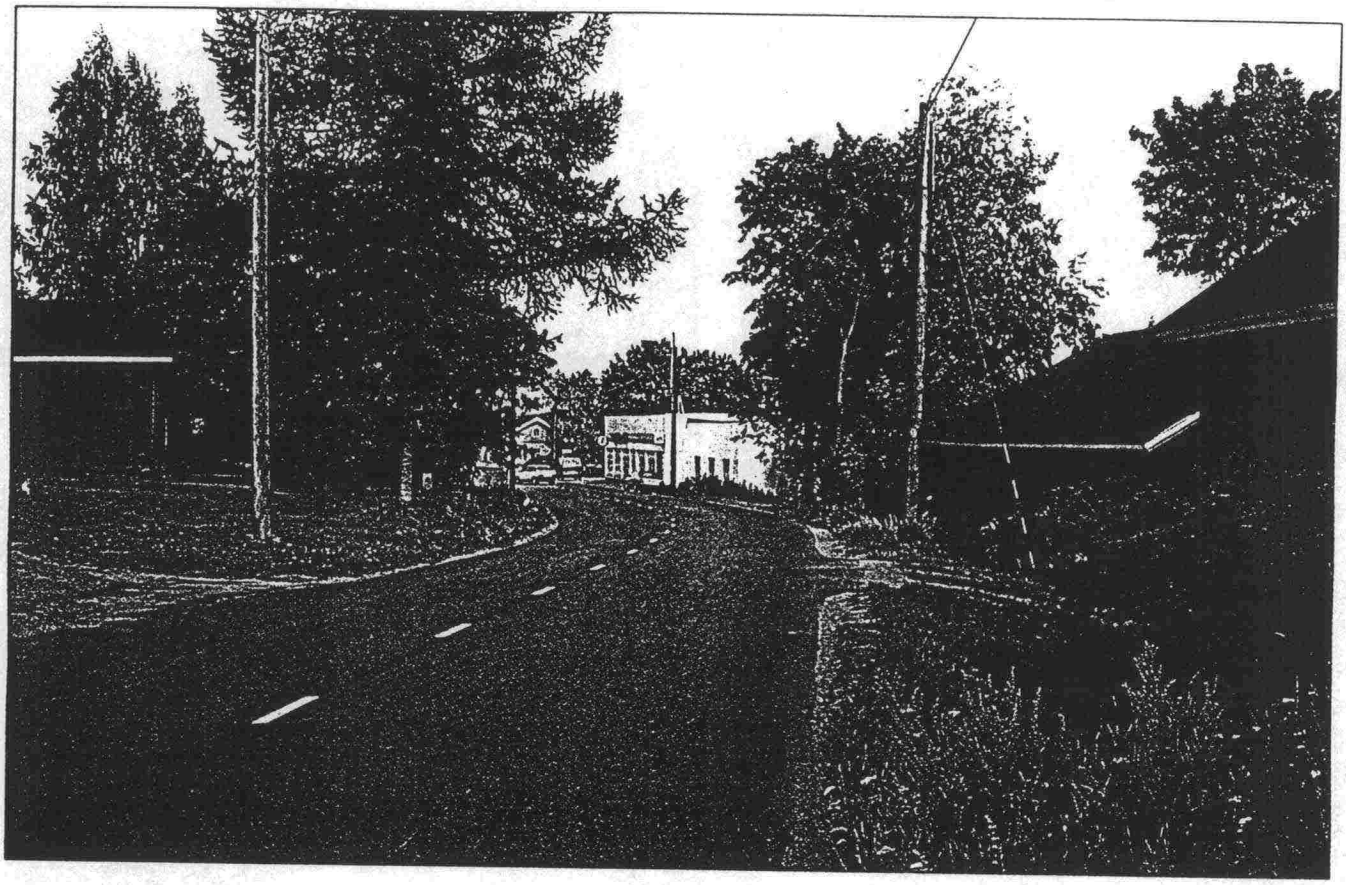
Church village highroad

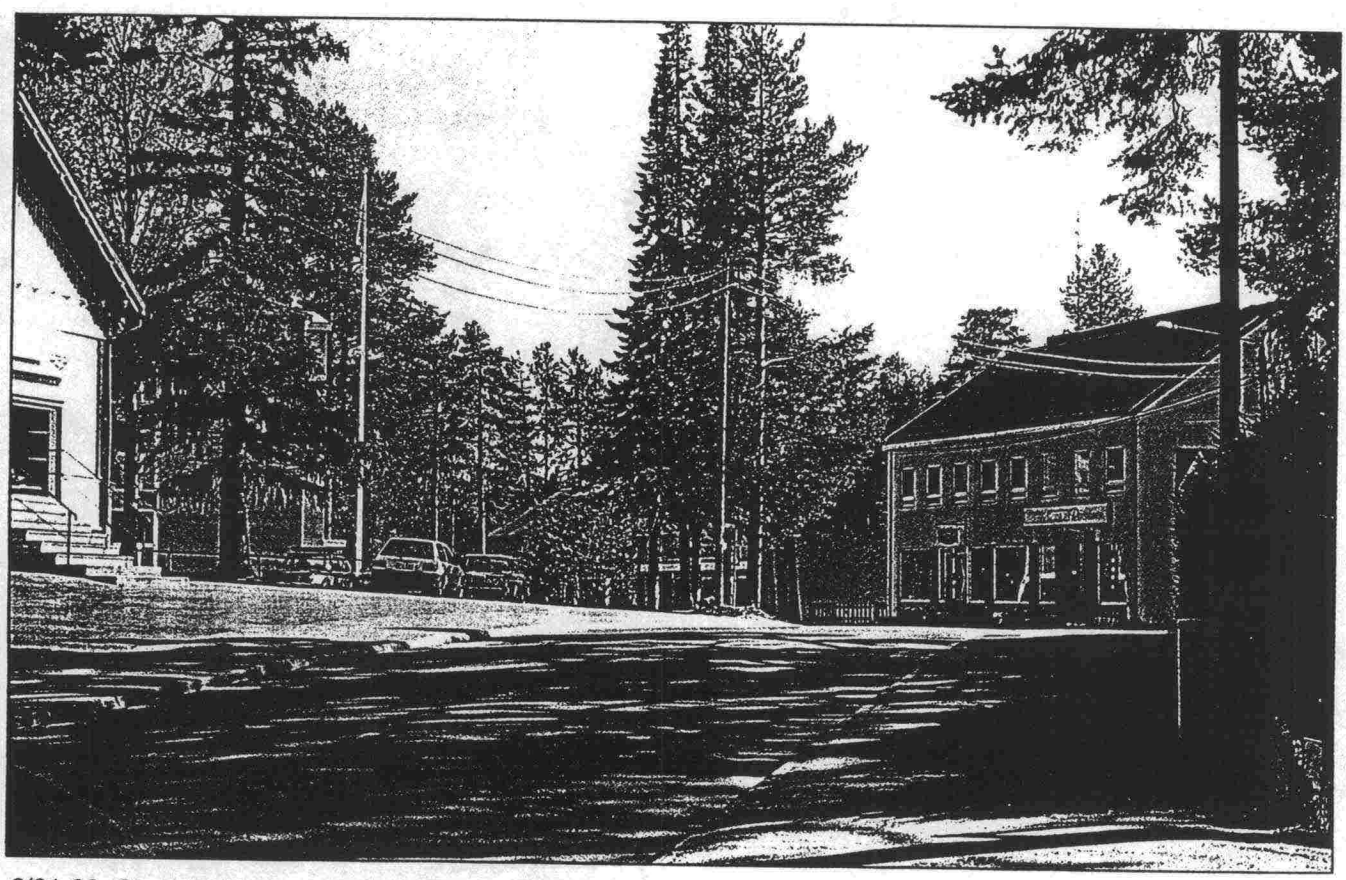
This heading covers what is probably the most common road section in a rural built-up area. This section has the following characteristics:

Most of the buildings along the section are pulled back from the traveled way. There are plenty of trees, dominating the view. Individual business buildings and their yards or parking lots adjoin the traveled way directly. Buildings close to the traveled way may form gateways and clusters akin to a market square. These, however, are exceptions; a spacious highroad-like appearance dominates the villagescape. The road provides long views along the road itself, and often also views of the surrounding fields or waterways.

The traffic volume is usually fairly low, and the flow is good. Since the built-up area is often linear in structure, the safety of crossing bike and pedestrian traffic is an essential point to consider, particularly at strictly defined locations such as business buildings, the bus depot, and school routes.

The measures used in a church village highroad section must derive from the environment. Urban designs may be applicable in individual cases, but they must be carefully fitted into the environment. For example, an elevated intersection zone may be appropriate in some places, but crosswalk islands with planting are more in keeping with the character of the environment. The use of details and elements alien to the environment (such as extensive colored stone pavement) must be avoided.



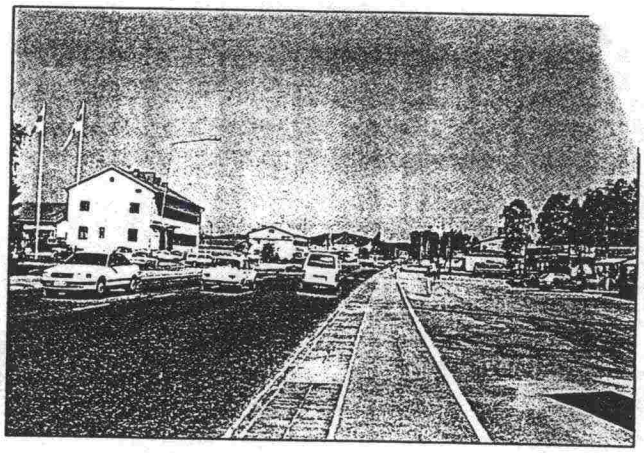


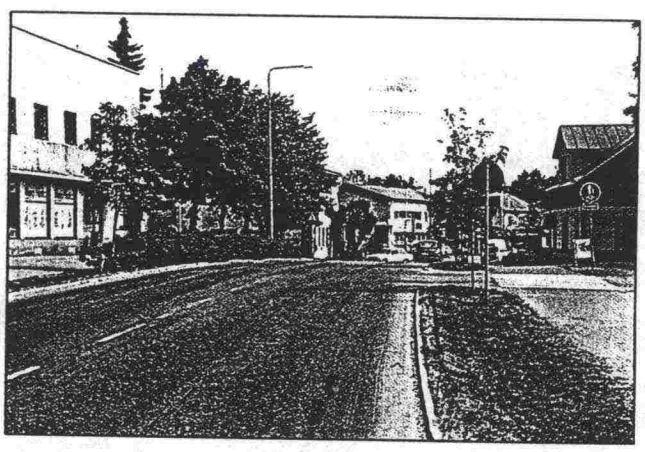
6/21-22. Church village highroads. Jaala, Pudasjärvi.

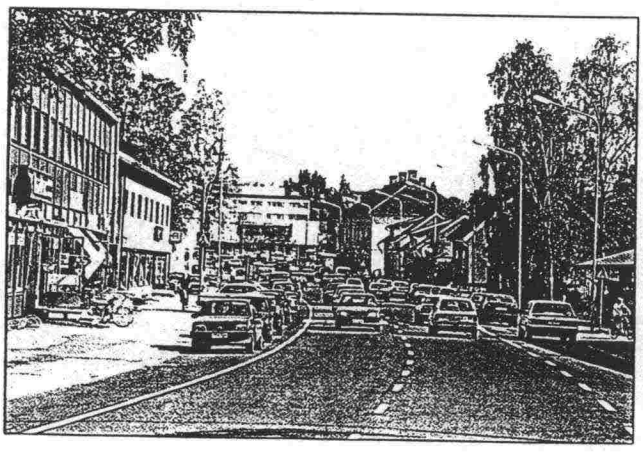
The shopping street

Safe road crossings for bike and pedestrian traffic are essential for the smooth functioning of the shopping street. Parking places are likewise of great importance. Traditionally, the parking places are located in front of the stores, often along the traveled way. Access must be provided for service traffic, but this requirement must not lead to expansion of the street space. A shopping street is always the most densely constructed place in a built-up area. The buildings delimit the street space in a very urban way in some areas, while in others this section can be highwaylike, in that the business buildings are pulled so far back from the road that there is no actual street space to be seen. Most of the shopping street area is paved, usually with asphalt. Individual trees are often important to the villagescape. The shopping street is frequently the oldest part of the area. All old buildings are important for its identity, so they should definitely not be demolished to make way for road improvements.

Urban technical design concepts such as bollards and elevated sidewalks, crosswalks and intersections can be used in the shopping street section. The traveled way and intersection design must be based on low vehicle speeds, and all excessively large designs must be avoided.







6/23-26. Different shopping streets. Ivalo, Juva, Sysmä, Paimio.

The market place

Many built-up areas have a functional focus, an area where many functions are concentrated and roads meet, often organized spatially as a square or plaza.

The market place is often part of the shopping street and characterized by a mix of different forms of traffic. The bike and pedestrian traffic flows in many directions, and parking space is an essential feature.

The market place is, in most cases, clearly delimited by buildings. It is often also an intersection area. Sometimes a market place that has evolved on its own has been laid out and paved as a square proper.

The aim of market place improvement is to preserve the character of the square. This requires an approach different from conventional road design.

Depending on the environment, the market place permits either village or urban design concepts. Its structure can always be emphasized with technical means, such as by using a type of lighting fixture typical of squares and placing the lighting so as to interrupt the continuity of the throughroad.

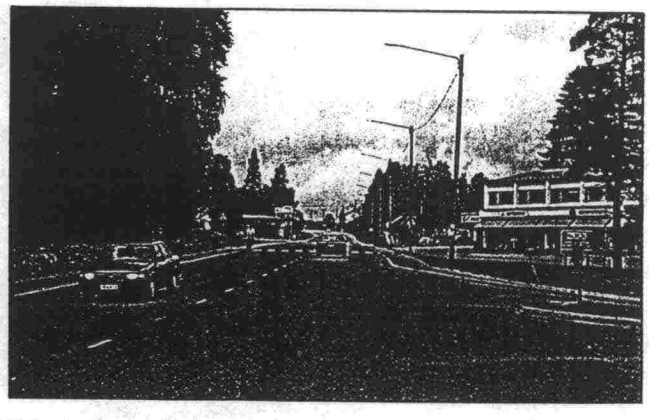
The thoroughfare

A thoroughfare is usually the result of recent zoning and road design. It may be a shopping street, but in appearance and design it is a thoroughfare. The business and service buildings along the road are pulled back and often have access from side streets. There are often parallel streets connecting the plots and parking lots along a thoroughfare.

The road is usually designed for a large traffic volume or made so spacious that the uninterrupted flow and high speed of motor traffic are the dominant features. Channeling and gateways (at important intersections) are design features frequently encountered. Parking facilities and bike and pedestrian traffic routes are segregated from the traveled way.

Without exception, thoroughfares need measures that improve the villagescape, reduce vehicle speeds, and heighten the status of bike and pedestrian traffic. In developing these measures, cooperation with the zoning planner is particularly important.

6/27. The market place in Rantasalmi.



6/28. A thoroughfare. Kerimäki.

6.4 Design principles

The purpose of this section is to provide ideas and approaches for throughroad design. These principles are grouped into sub-designs that are interdependent and form the overall design aimed at.

These ideas do not constitute a design compendium, merely guidelines.

6.4.1 Street space design

The basis of street space design is to segment the throughroad into sections. Every road section has a beginning and an end, which should be in some way visible as changes in the traffic environment ('gateways'). Each road section also has an 'elevation', formed by buildings or planting, which delimits the space.

Street space delimitation

The central factor in street space design is street space delimitation. Traffic is movement in a space, which can be open or closed. The speed at which the traveler moves affects how he perceives the space and particularly its scale. The faster his speed, the smaller the scale seems, relatively speaking. In other words, an environment where speeds are high can be constructed on a large scale, while a road section where speeds are low should be conceived on a small scale. Important elements in the street space scale and its rhythm are, apart from buildings, features such as lighting poles, planting, and street surface materials. A street space that is moderate in size and delimited by buildings is usually perceived as a single entity.

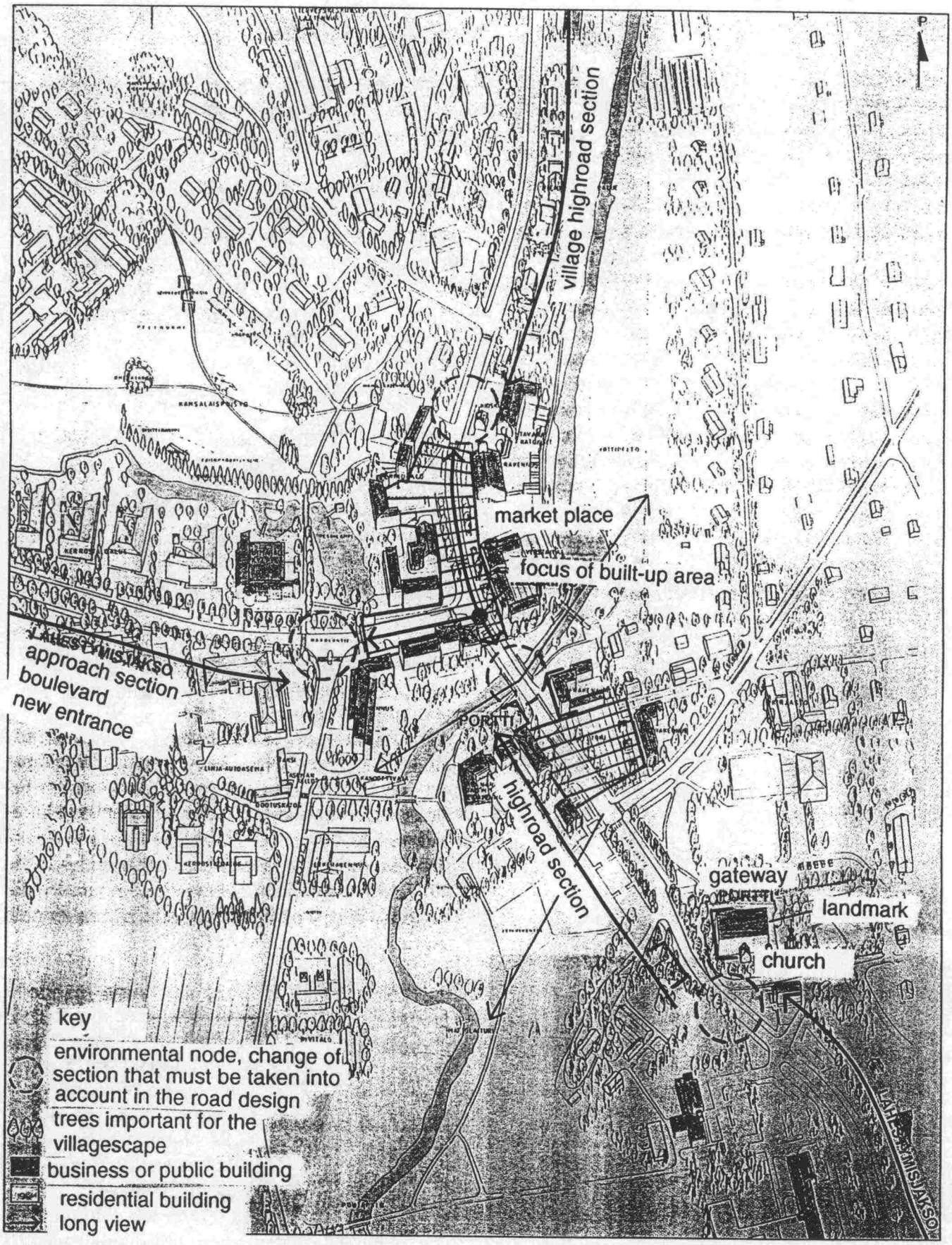
In rural built-up areas, buildings are often low in relation to the width of the street space. However, the shopping street and/or market place often contains spaces clearly delimited by buildings. In sections where this is the case, the street space is designed to extend from wall to wall on the detail level, too.

Trees in such sections usually consist of individual trees or groups. Regular rows of trees can be used to delimit, for instance, any gaps in the building wall caused by parking lots. Cooperation with the zoning planner is essential, since street space delimitation based on buildings must be preserved in the future as well.

An delimited urban street space can also be created with regular rows of trees, i.e. a boulevard. In classical urban construction, a row of trees emphasizes the importance of a street. It was on the basis of this tradition that the first rows of trees were planted in rural built-up areas along roads leading to manor houses or churches. More recently, this principle has been lost, and rows of trees have been used without regard to their traditional townscaping hierarchy.

A useful design method in developing street spaces is to draw the street elevations on a sufficiently large scale, since this will reveal the points where space delimitation is weak and needs improvement. Often the best tool for examining the space delimitation in a center is a scale model. An architect and a traffic planner must always cooperate in designing a street space. It was found in connection with this project that it is regrettably common practice to revise a center development plan without paying any attention to the street space, which in turn results in a confused villagescape.

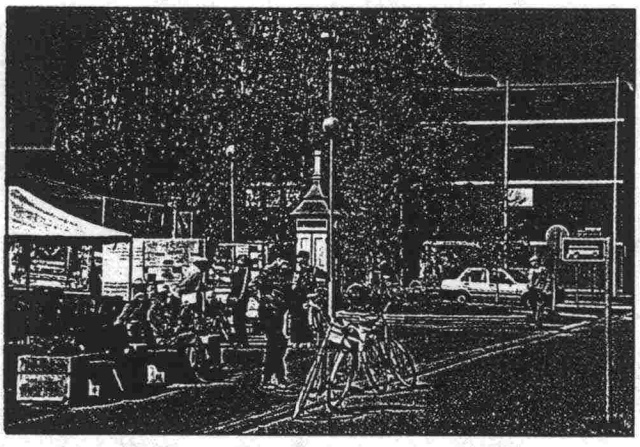
Street space delimitation can vary. The street space can close and open according to the buildings and trees lining it, without any fixed rules. The typical traditional church village highroad that evolved by degrees is an example of this kind of street space. We must note, however, that even this sort of highroad has traditionally had a streetscape as clearly defined and compact in ambiance as any city street. Consequently, it is of great importance to preserve even individual old buildings in an environment such as this. In zoning done over recent decades, there has been a tendency to change the old highroads into boulevards or to force them into a regular grid plan; thus, there are not many old village highroads left. In those remaining, the traditional mode of construction must be preserved.



6/29. An example of the elements in the villagescape of a small built-up area. It is important to identify the properties of the various street spaces and environmental entities and find means to enhance them. The boundaries between sections should be visible in the road design. Perniö.

Edges, nodes and landmarks

Both the natural environment and the built-up environment consist of components with different characters. How well these areas can be told apart is an important component of the villagescape. The fringe or edge of an area, the change from one type of area to another, helps the viewer to organize the environment in his mind. The concept 'environmental readability' refers to a number of things, including not only such edges but also space formation as discussed above, spatial sequences, and views formed of consecutive spaces. The presence of edges and gateways makes the environment more interesting and, according to an extensive environmental psychology study, is seen as a factor increasing security: the environment is perceived as containing different places where one can be, depart from and arrive. From the point of view of throughroad design, the gateway is important as indicating a node between different road sections. Destroying plurality and eliminating the diversity of an environment's subsections, i.e. expanding the predominance of uniformity, is seen as conducive to decreasing the appeal and security of the environment.



6/30. A market place is functional if it is well designed and placed at the functional focus of the BUA. Muhos.

6.4.2 Cross-section

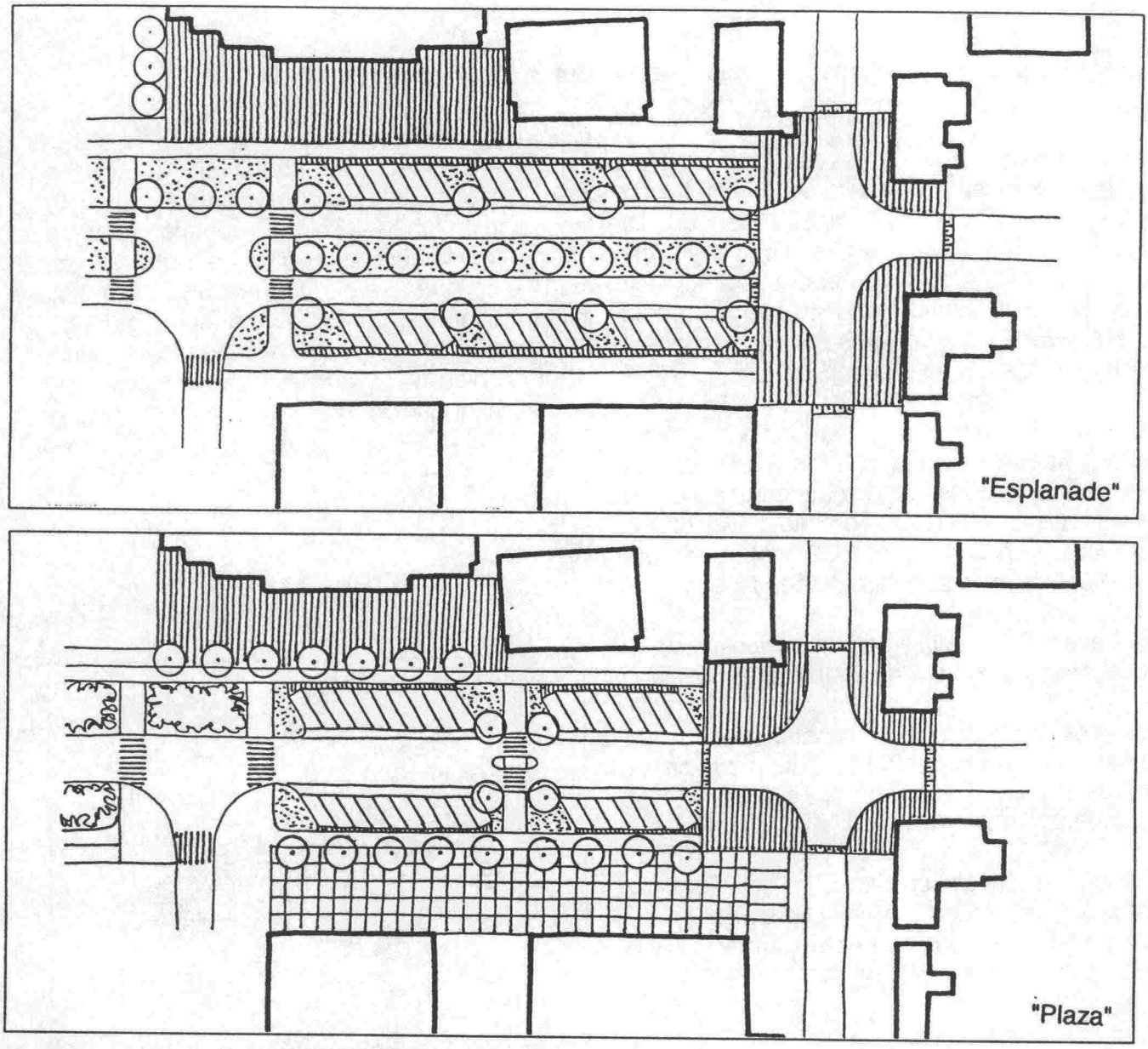
The cross-section of a throughroad must be designed so that it supports the speed level and villagescape goals.

The design process for a throughroad includes not only the traveled way and bike and pedestrian traffic paths but also the space between the road and the buildings, and the traffic connections of the plots behind the buildings. These points are particularly important in the shopping street section if the goals concerning parking, service traffic and environmental improvement are to be met.

Designing the cross-section of a throughroad includes correct scaling of the various parts of the road (the traveled way, parking places, bicycle paths, pedestrian areas) in all its sections. Ready-made cross-sections cannot usually be used, since the design process must involve the entire street space, not just the traveled way.

If a cross-section is designed in the conventional way, i.e. beginning at the centerline and ending when the space required for traffic (motor traffic, parking, bike and pedestrian traffic) is complete, the end result is often contrary to the design goals. The space between opposite rows of business buildings is great in many built-up areas, and the design process described above may lead to 'no man's land' in front of the stores. This extra space is quickly taken up by parking unless it is designated for other uses (see Fig. 6/33).

If there is space between the stores, a variety of designs may be proposed. The 'Esplanade' model (Fig. 6/31) provides for sidewalks and bicyle lanes in front of the stores, angled parking in front of them and a wide tree-lined median in the middle of the traveled way. In the 'Plaza' model (Fig. 6/32), a spacious plaza has been laid out in front of the stores as a meeting place for pedestrians and for stalls. The stores and cafés could also extend their operations into the plaza in summer. However, it would be difficult to prevent parking in the plaza area, unless physical obstacles were installed.



6/31-32. Examples of cross-section design in a wide street space.

The focus of the center, the throughroad cannot be continued through a market place with the same cross-section as elsewhere; the character and smooth functioning of the market place must be preserved by defining it as an area clearly different from the rest of the road. The main features are pedestrian space and parking space, if parking space cannot be provided elsewhere. The significance of a market place for one side of the road can be emphasized by expanding it across the road and raising the level of the road. This also improves traffic safety, since the elevated market place acts as a hump to reduce vehicle speeds.

It is possible to use standardized cross-sections in the fringe areas of the center, i.e. in the approach sections, but each case should be carefully considered. For instance, a standard-width median should not be built if it would require trees to be chopped down or buildings to be demolished or moved. A pleasant result can often be achieved by building a median whose width varies with the environment; the median could even be reduced to a simple curbstone.

Shallow roadside ditches can be used in the approach sections, but in the center the road

drainage must be designed without open ditches.

The traveled way cross-section of the throughroad must be scaled according to the vehicle speeds and the space needed by vehicles passing head-on. The traffic volume affects the number of lanes needed, but not their width. The daily traffic along a shopping street must be over 20,000 vehicles per day before it is justified to create a four-lane street.

The space requirement for two heavy vehicles meeting head on at low speeds (® 40 kph) is about 6.0 m; at 50 kph, the requirement is about 6.5 m. This is calculated on the basis of the maximum vehicle width (2.6 m) and the movement margins at different speeds.

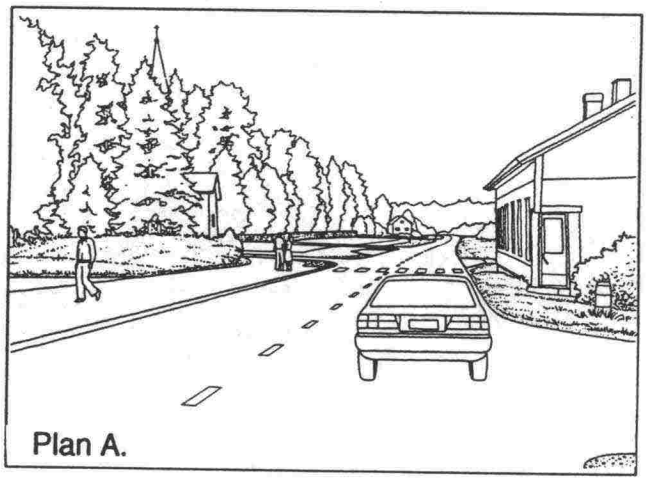
The traveled way must not be dimensioned to accommodate two passing oversized vehicles.

One possible type of constraint is road narrowing, where there is not enough space for vehicles to pass. The space requirement is then only 3.0 m.

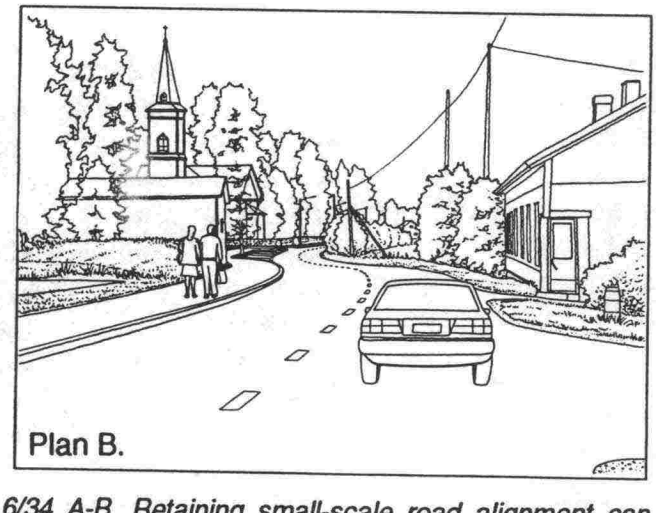
At islands in straight sections, the traveled way can be 3.0 m wide. At intersections, the space required by turning vehicles affects the dimensions of the traveled way.

6.4.3 Alignment

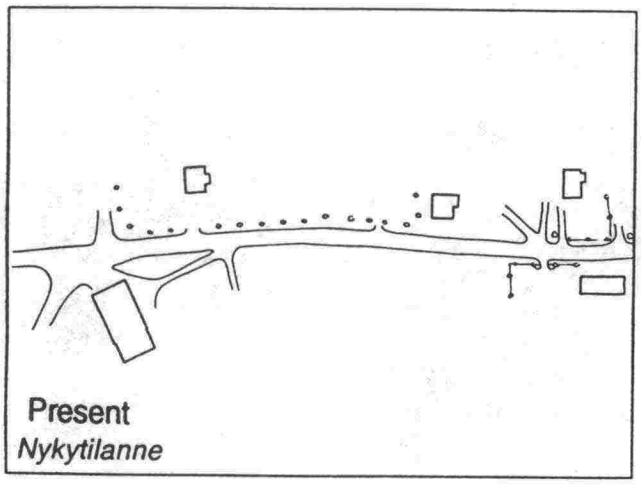
If an old, small-scale road alignment is still in existence, it should be preserved. Leveling a road, either horizontally or vertically, usually leads to higher vehicle speeds and a fragmented villagescape. This is because the road becomes an independent element, separate from the area structure (see Fig. 6/36). Changes in the present situation that seem slight on plan maps and in cross-sections may be very significant in reality.

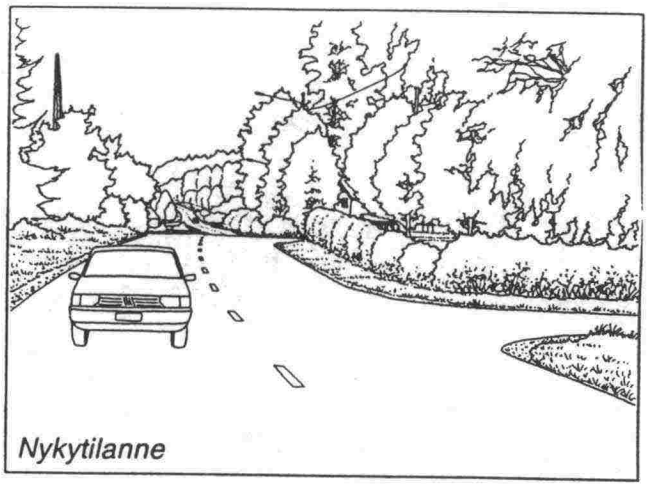


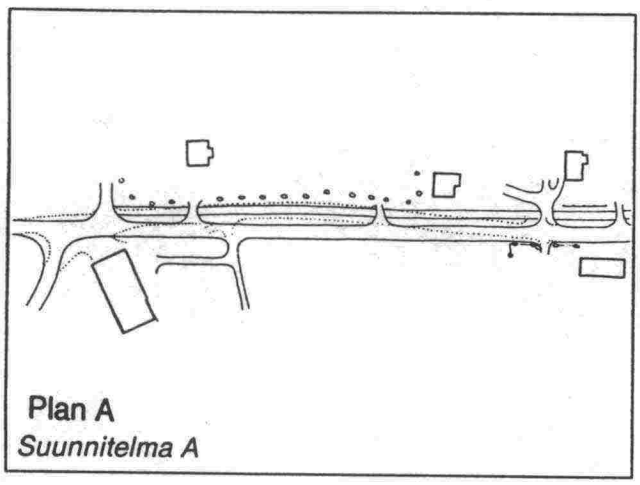
6/33. If there is extra space on plots, parking areas will inevitably spring up between the bike and pedestrian traffic paths and the business buildings.

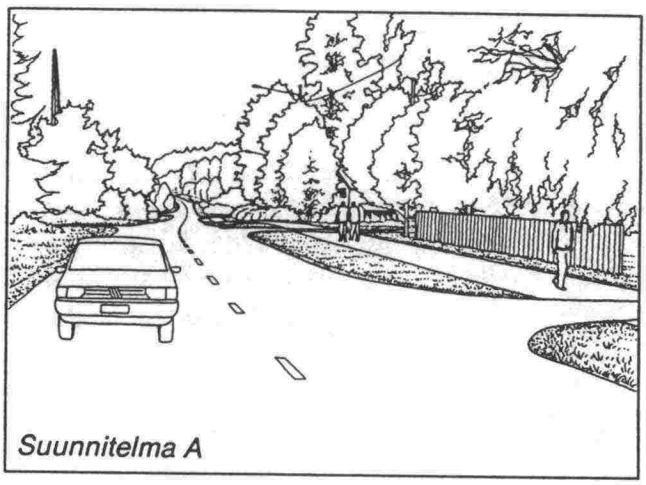


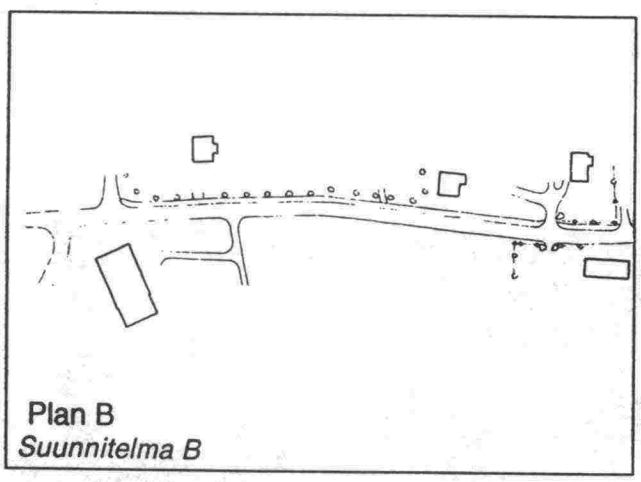
6/34 A-B. Retaining small-scale road alignment can help preserve the traditional villagescape and moderate travel speeds.

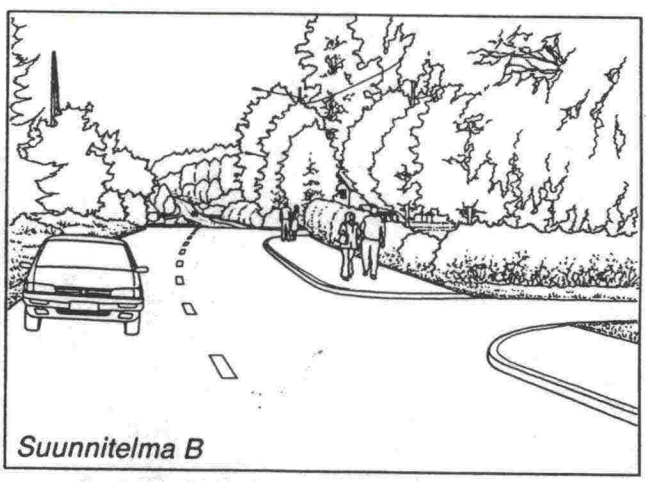












6/35 A-F. Retaining the existing small-scale vertical and horizontal road alignment can help preserve the traditional villagescape and moderate travel speeds.

At low vehicle speeds (30 to 40 kph), the geometry of the road must not be based on minimum values based on driving dynamics. However, all vehicles must be able to drive along the road at low speeds.

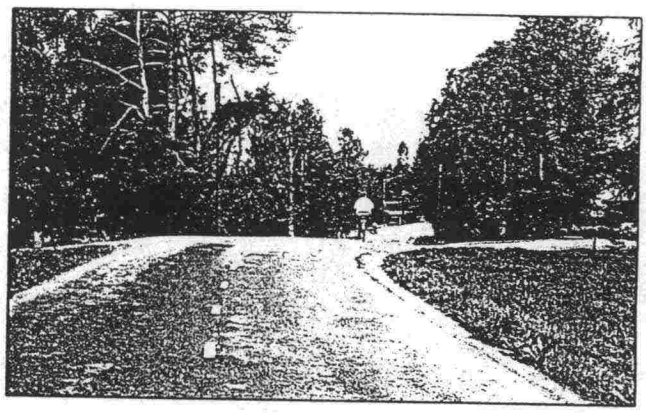
The alignment itself can be used as a constraint by creating small-scale alignment features (Fig. 6/35) and by deviating from the present alignment in places.

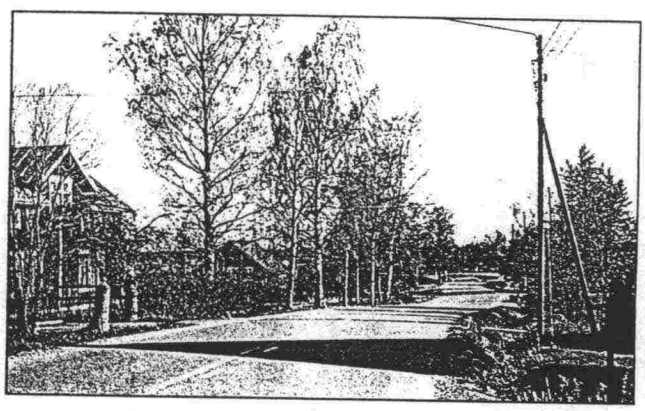
Small-scale vertical geometry also affects vehicle speeds; it is also of great importance to the villagescape, and thus should not be leveled.

In built-up downtown areas, it is environmentally appropriate spatial design that is the most important, not road geometry, as in the case of road layout design in rural areas.

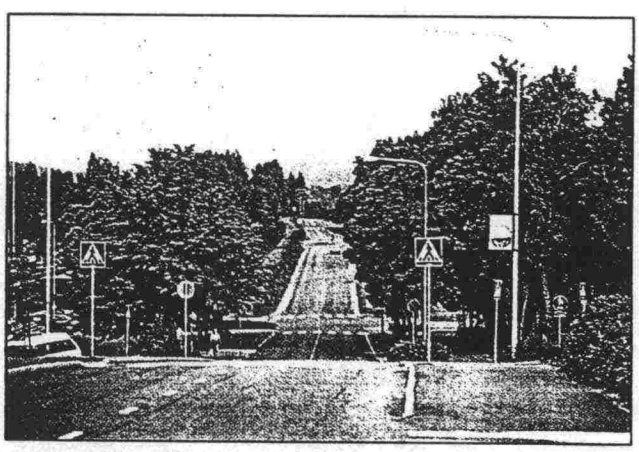
The basis for vertical road geometry design must be to suit the road level to the surrounding buildings and yards. As far as old buildings are concerned, the main rule is that the foundation must be visible. If the surrounding buildings require the road level to be lowered, this can be done even over a short distance. A throughroad can be hilly.

Traveled way camber helps to fit the road elevation to the surrounding environment. The slope of any parking bays adjoining the traveled way must be designed so that the level suits the environment. The slopes and drainages of the traveled way, the parking spaces and the bike and pedestrian traffic paths must be designed so that runoff water from the road does not flow onto adjacent plots.

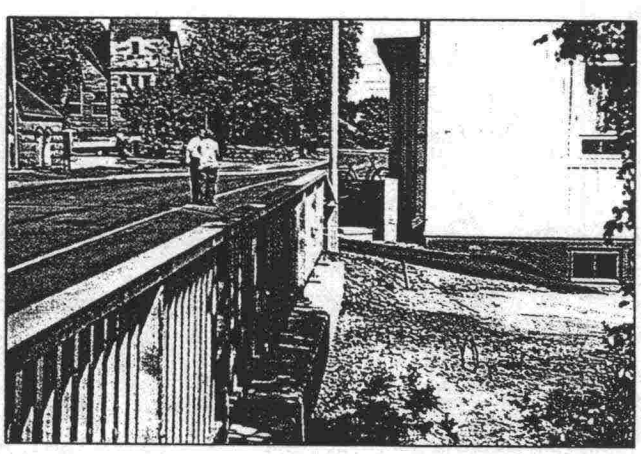




6/37-38. Retaining small-scale road alignment is a basic requirement for preserving the character of the environment. Sumiainen, Sulva.



6/36. If the road alignment within the BUA is too straight, it segregates the road from the surrounding structure, allows higher travel speeds and makes intersections dangerous. Heinävesi.

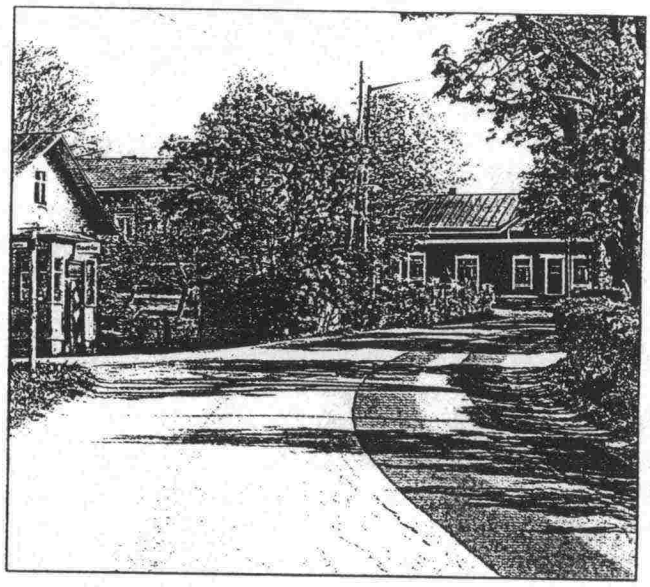


6/39. The leveling of the small-scale vertical geometry of the road is visible in the villagescape and weakens the status of old buildings. Panelia.

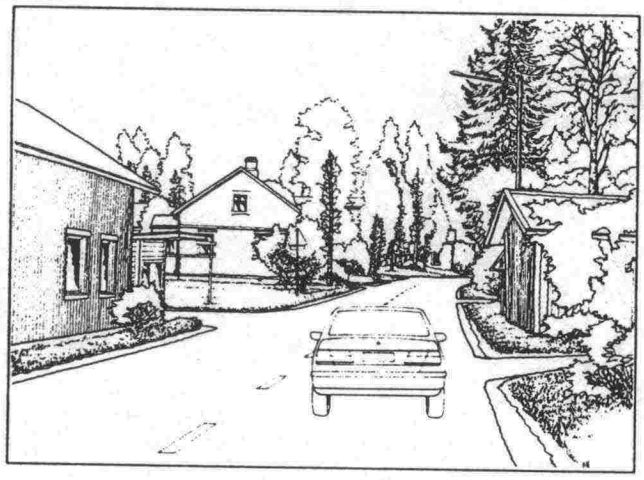
6.4.4 Bike and pedestrian traffic

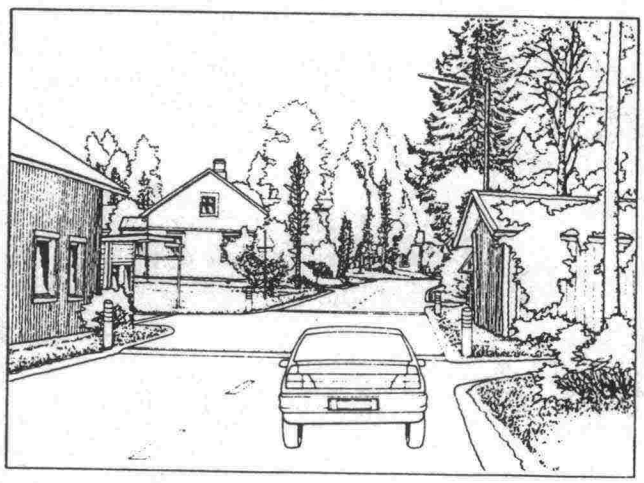
In bike and pedestrian traffic design, the main emphasis is on designing safe routes, with particular reference to road crossing.

Bike and pedestrian traffic is usually segregated from motor traffic, with a pathway of its own. A separate pathway is not necessary in shopping street sections with low traffic volumes (daily traffic under 1000 vehicles per day) and no through traffic, provided that vehicle speeds can be kept low (about 30 kph) with structural features. It is also worthwhile conducting interviews to establish whether road users consider this a safe enough arrangement.

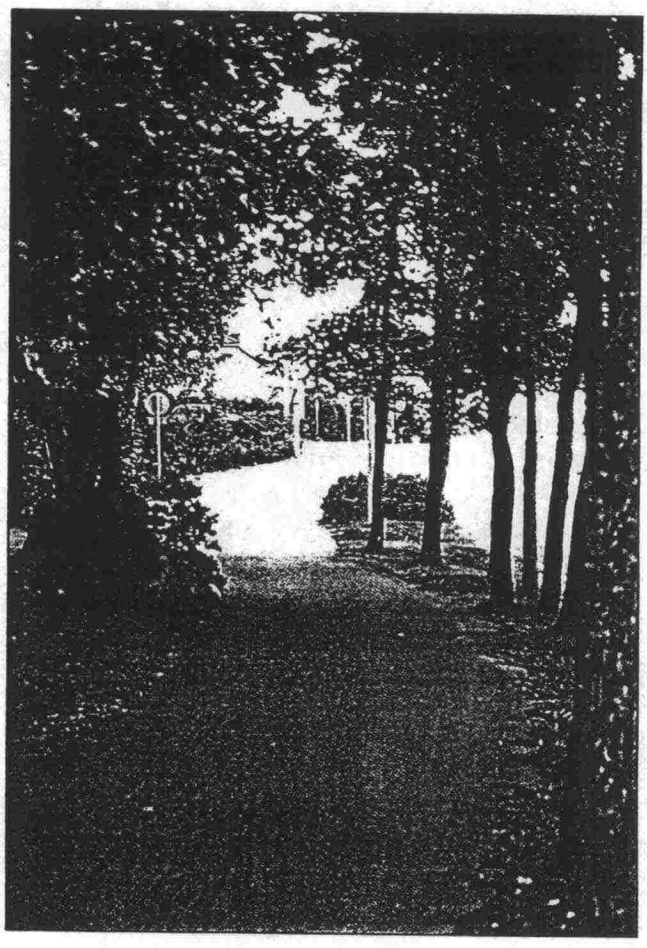


6/41. Densely built small-scale highroad sections cannot be fitted with a bike and pedestrian traffic lane adjacent to the traveled way without destroying the fundamental character of the environment. The answer is to build a completely separate bike and pedestrian traffic path or to reduce vehicle speeds so much that no separate path is necessary. Pomarkku.





6/40 A-B. An elevated intersection next to a kiosk on a village highroad.



6/42. A carefully landscaped bike and pedestrian traffic path in Heinävesi.

In shopping streets, the bike and pedestrian traffic lanes and zones must be run in front of the stores as far as possible, to avoid any crossings between bike and pedestrian traffic and parking traffic.

A sidestrip 0.7 to 1.0 m wide must be placed between the bike and pedestrian traffic lane and curbside parking to avoid any dangerous situations caused by opening car doors.

In sections with high bike and pedestrian traffic volumes, it is a good idea to segregate the pedestrian and bicycle lanes. Whether moped traffic should be placed in the bicycle lane or the traveled way is a matter to consider separately in each case; factors affecting this are the space available for the bicycle lane and the vehicle speeds in the traveled way.

Shopping streets have high volumes of pedestrian traffic, and thus the bike and pedestrian traffic paths can be twisty; fast bicycling is not to be favored. However, if the bike and pedestrian traffic path is not passable enough, bicylists will migrate into the traveled way.

Road crossing must be easy and safe in the shopping street section. There must be enough crosswalks, and waiting times should not be too long. The following measures can simplify road crossing:

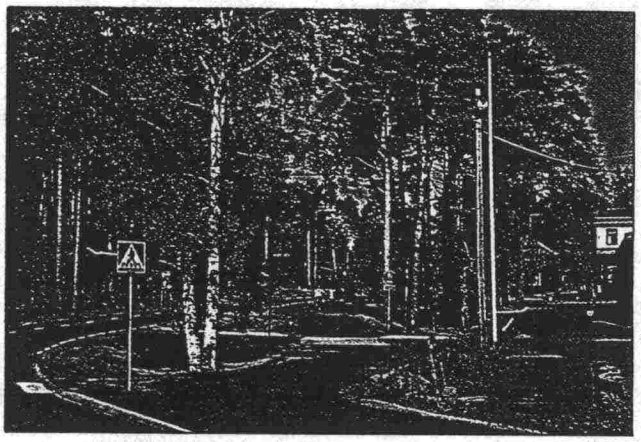
- central islands at crosswalks
- elevated crosswalks (the length of the elevated portion along the traveled way should be about 10 m so that both the front and the rear wheels of a bus fit on it)
- elevated intersections or sections of road
- narrowings.

Efficient measures for crosswalks in side roads are elevated crosswalks and narrowings at intersections.

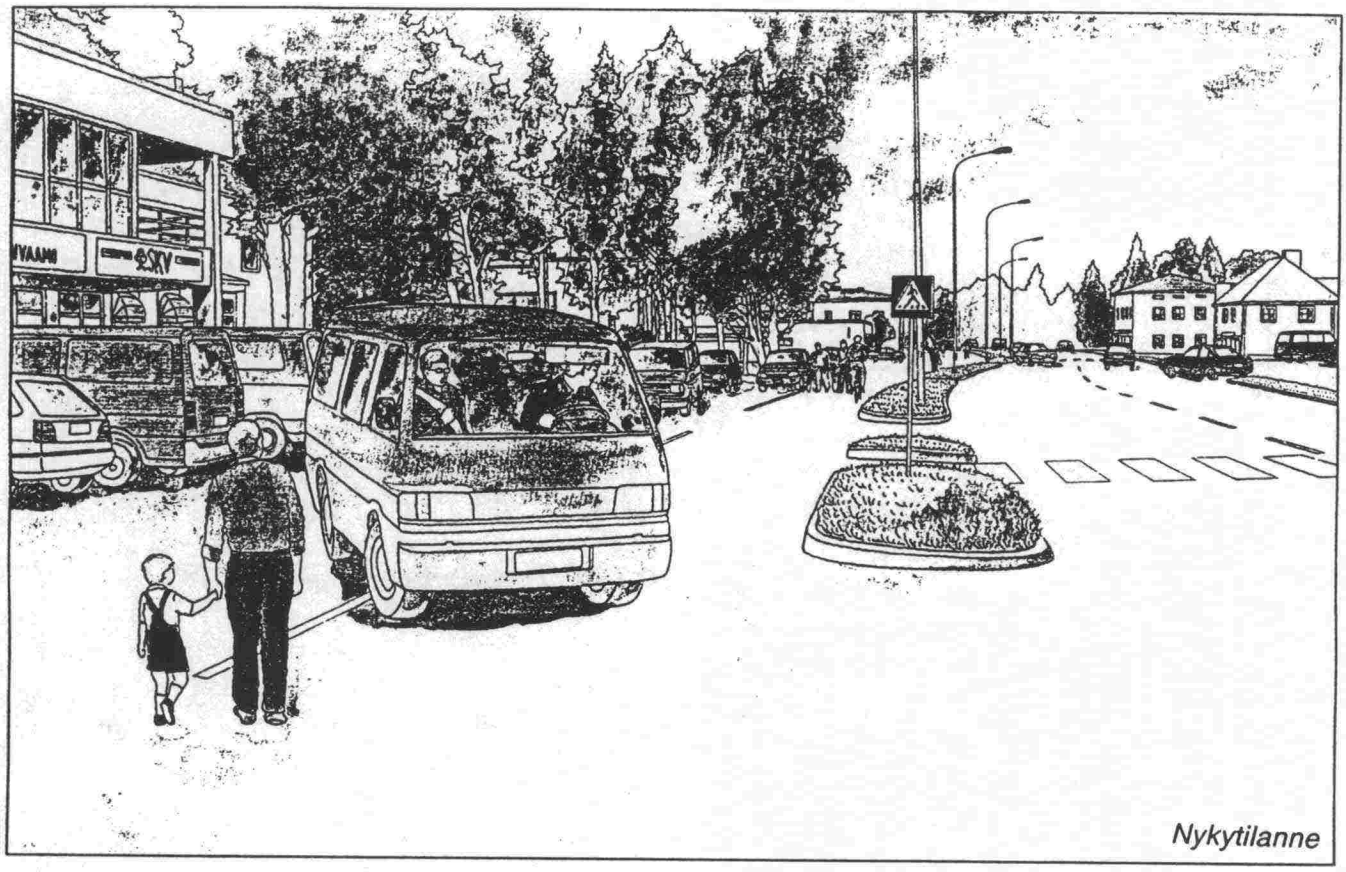
The residents of a built-up area tend to congregate in certain places due to the functions there. Such areas should be provided with ample public space. A parking lot is not a feasible public space in this sense. In market squares in the center, it should be possible to cross the road safely anywhere on the square. One way of ensuring this is to raise the traveled way throughout the length of the square.

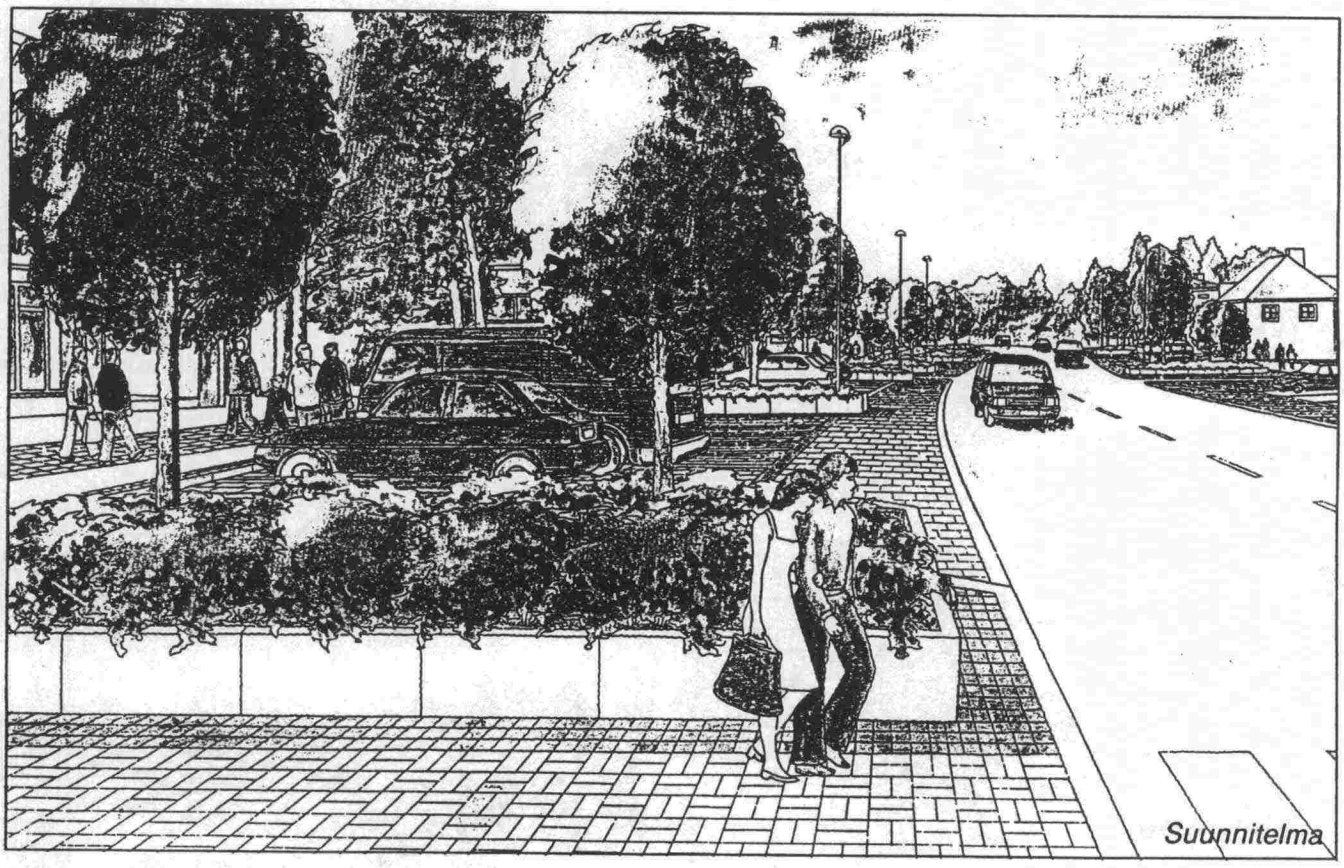
In approach sections, it is often advantageous for the villagescape to have a bike and pedestrian traffic route separate from the throughroad to enable it to follow the terrain independently and to conform to the existing environment.

Crosswalk safety in approach sections can be improved with central islands, for example.



6/43. 'Tree-saving' bike and pedestrian traffic path placement. Ii.





6/44 A-B. Crossings between parking traffic and bike and pedestrian traffic can be minimized by placing bike and pedestrian traffic paths in front of business buildings, and parking spaces adjacent to the traveled way.

6.4.5 Parking

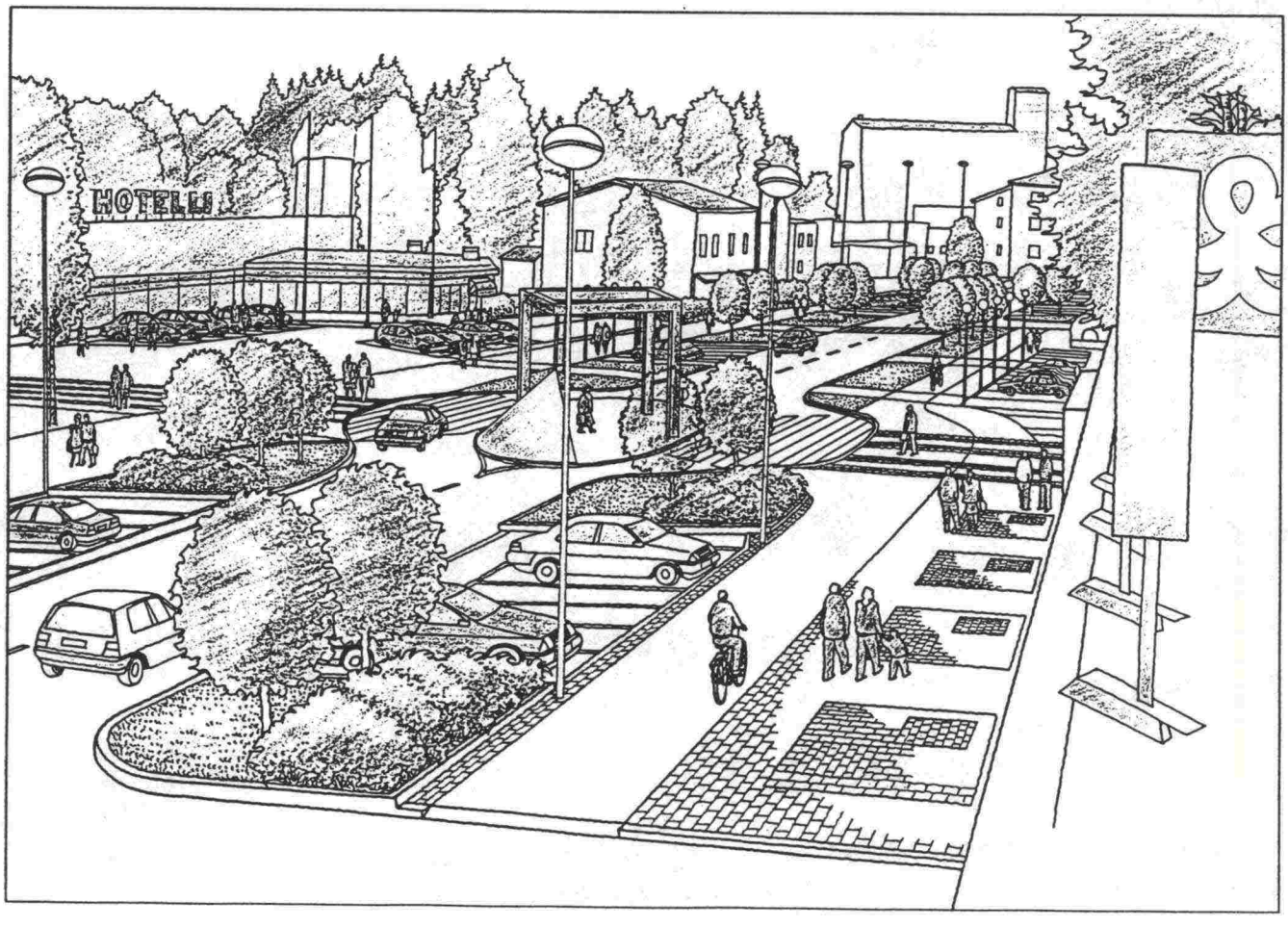
The parking space requirements of a downtown business district can be met with parking spaces designated in the zoning plan and built by property owners. These can be designed as separate parking lots or as curbside parking.

A significant part of the parking capacity should be placed in parking lots or garages jointly serving several stores or businesses; these facilities could be placed between or behind the business buildings, reducing the number of parking lots needed and thus the number of parking places. The aim is for motorists to walk between stores once they have parked their cars. The use of parking lots behind buildings can be simplified with adequate signals (e.g. signs displaying the number of free spaces in a parking facility). Large parking lots should not be placed in front of stores.

The most important features in the shopping street section are a good service level for bike and pedestrian traffic and ease of parking. Curbside parking is the simplest way to ensure the latter. Angled or parallel parking spaces for short-term parking can be directly off the roadway, avoiding any conflict with bike and pedestrian traffic, for which there is ample space between the parking spaces and the store fronts. The arrangement should not take the form of extensive uniform fields; the area must be broken up with planting, for instance. Angled curbside parking is best suited to shopping streets and market squares in which vehicle speeds have been well reduced.

The parking facilities must also support the villagescape goals, so parking design must be considered separately for each built-up area and road section.

6/45. Example of angled parking in a shopping street.



6.4.6 Intersections

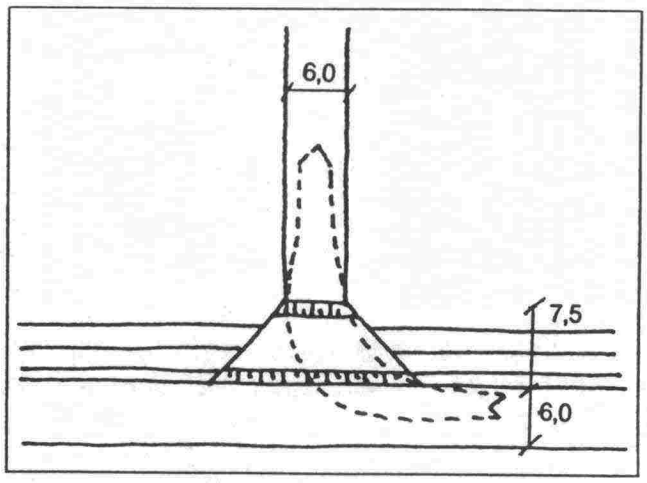
Intersections in the shopping street section must be dimensioned on the basis of a speed limit of 40 or 30 kph and the types of vehicles using those intersections. The purpose of this dimensioning is to moderate vehicle speeds. Intersections should be only big enough to allow the passage of the largest vehicle using them.

If an intersection is used daily by delivery and garbage vehicles, it should be dimensioned to allow these vehicles to turn off the shopping street without using the opposite lane. A semitrailer combination truck, a vehicle that uses the intersection very rarely, would have to use the opposite lane for turning.

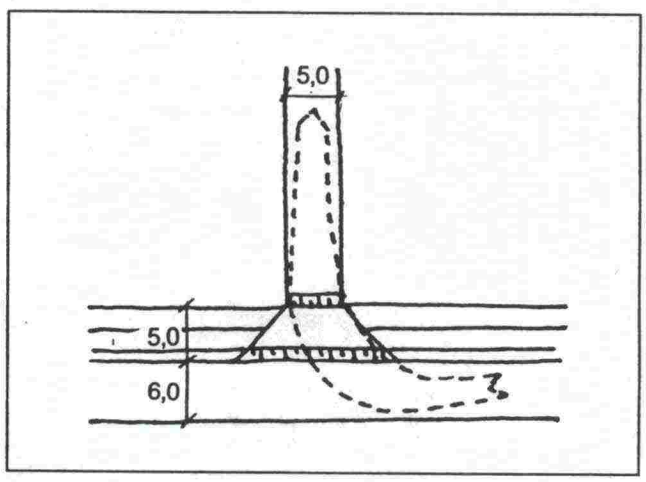
Driveway intersections must be designed so that the bike and pedestrian traffic path crossing the intersection is elevated on both sides.

If the service traffic to a store constantly includes a semitrailer combination truck, the intersection must be about 6 m wide, and the widening must begin about 7.5 m from the edge of the traveled way, or the round-off radius must be about 10 m (Fig. 6/47). If the service traffic is handled with normal delivery vans, the intersection can be narrower, and the widening zone need not be as long (Fig. 6/48).

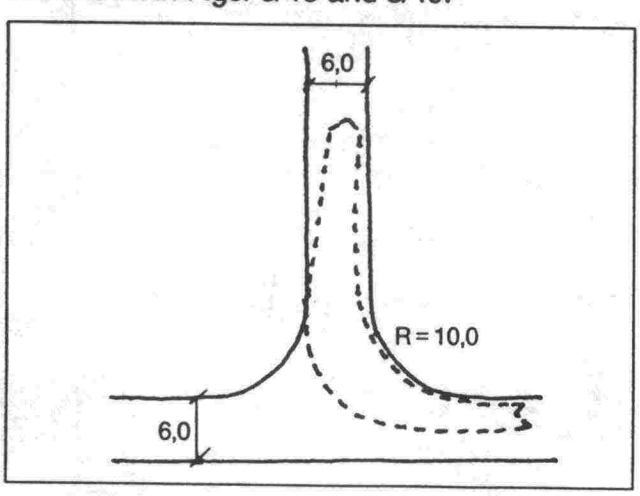
The minimum dimensions for zoned roads adjoining the shopping street to accommodate a semitrailer combination truck and a delivery van are shown in Figs. 6/46 and 6/49.



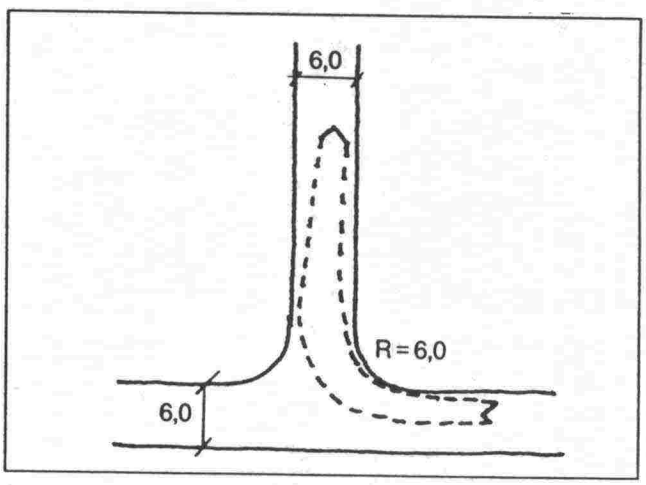
6/47. An intersection where a semitrailer combination truck can turn into a plot without using the opposite lane.



6/48. An intersection where a semitrailer combination truck must use the opposite lane when turning into a plot.



6/46. A zoned road intersection dimensioned for a semitrailer combination truck.



6/49. A zoned road intersection dimensioned for a delivery van or garbage truck.

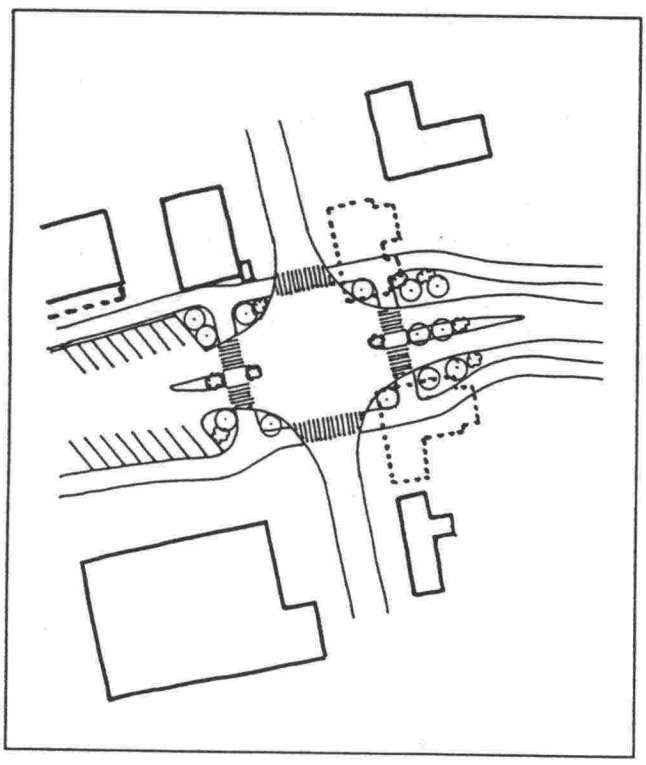
Sight distance requirements are not sufficient grounds for demolishing old buildings close to intersections or for removing planting important to the villagescape. If speeds are low, intersections can be arranged so that even short sight distances are sufficient. For example, raising the intersection zone lowers travel speeds to about 20 kph on all approaches, in which case there is sufficient sight distance even if there is a building right next to the intersection. Short sight distances also tend to moderate vehicle speeds.

An elevated intersection also requires less space than an intersection with islands (Figs. 6/50 and 6/51).

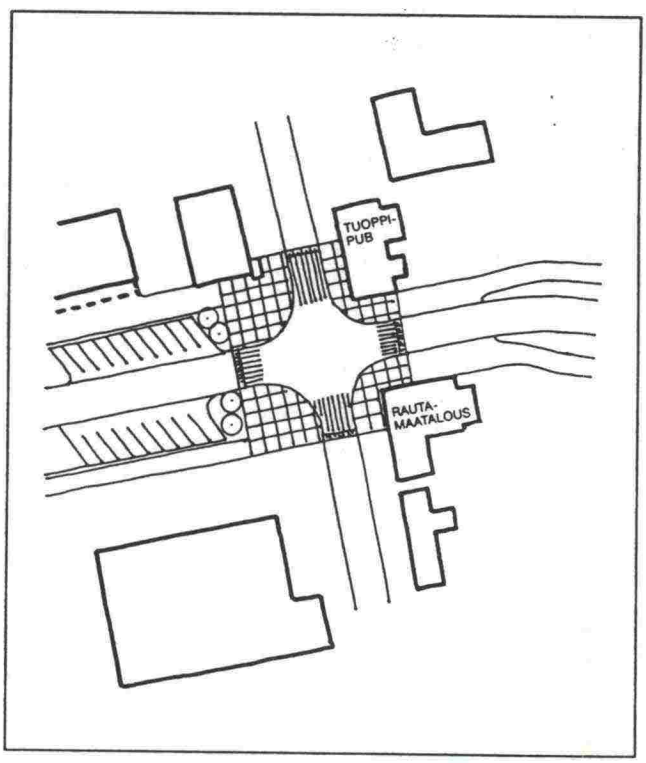
It must be very carefully considered whether there is any justification for channeling intersections in the shopping street section. It is not usually important to have an even traffic flow in the shopping street, since safe road crossings for bike and pedestrian traffic and easy merging into the road have priority. Channeling rarely improves the safety of either motor-vehicle or bike and pedestrian traffic in built-up areas. Channeling is a means of improving motor traffic flow, and should be used in shopping street sections only if traffic volumes are so high that the waiting times for turning traffic and the lines thus formed are unreasonably long. If this is the case, there is an obvious need for traffic signals; such problems are encountered with traffic volumes of over 10,000 vehicles per day.

Channeling may also be justified in shopping street sections in cases where the network status of the throughroad is high (class I or II main road) and the functionality goal for through traffic is therefore higher than in shopping streets in general.

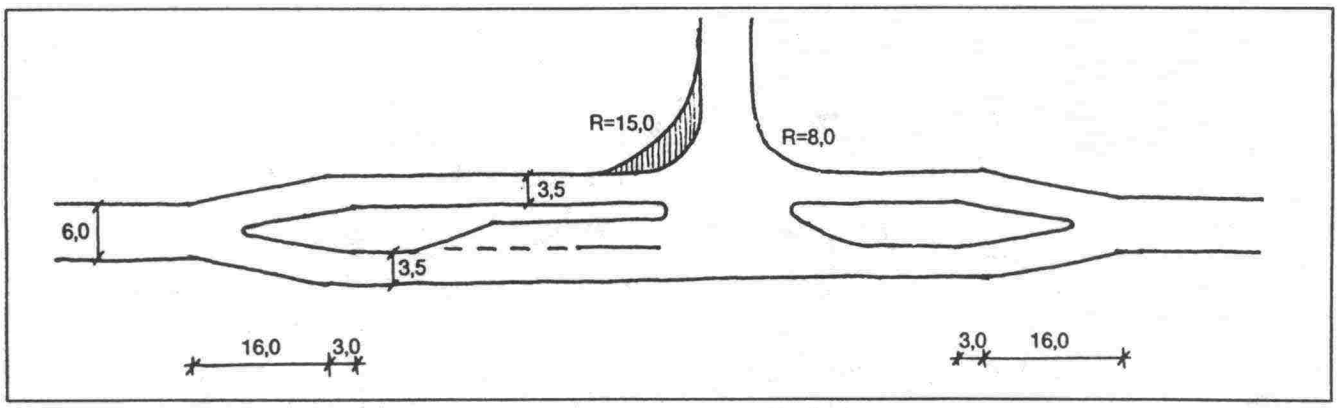
Channeling must be dimensioned for low speeds; channeling design can also moderate speeds. Figure 6/52 shows an example of channeling dimensioned for 40 kph, aiming to moderate the vehicle speeds of traffic approaching the intersection and to improve the safety of bike and pedestrian traffic crossing the road.



6/50. An intersection with central islands needs space.

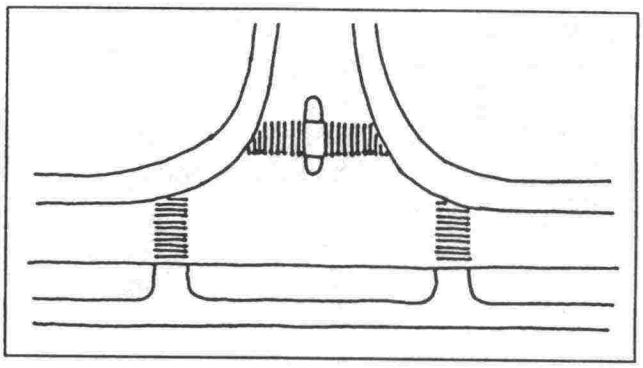


6/51. An elevated intersection reduces speeds from all directions and does not require much space.

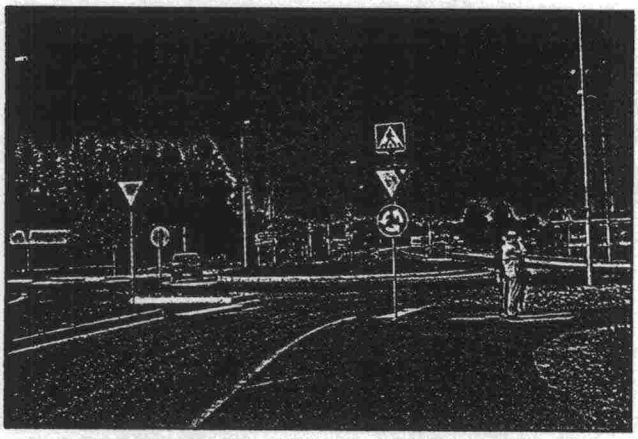


6/52. An example of channeling dimensioned for a speed limit of 40 kph.

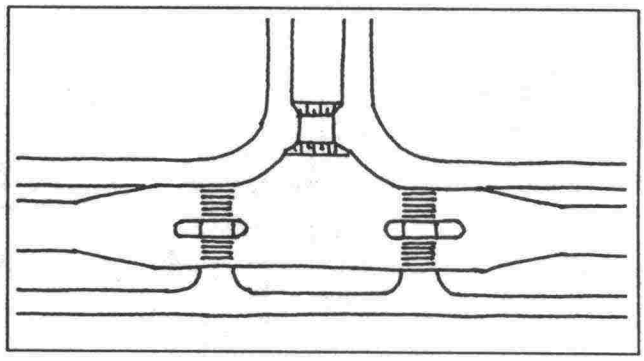
A rotary intersection is a design well suited to throughroads. It moderates speeds and is usually more effective than a channeled intersection. A natural place for a rotary intersection is at the end of a throughroad (normal size rotary intersection), between two sections (mini-rotary intersection) or as the major intersection at the center of the built-up area. An example of a mini-rotary intersection is shown in the case study of Kuhmo, Fig. 6/138.



6/54. A laterally channeled intersection is broad.



6/53. A rotary intersection at the junction of the center bypass and the shopping street in Lammi.



6/55. An elevated crosswalk and laterally narrowed traveled way improve the safety of bike and pedestrian traffic but do not take up much space.

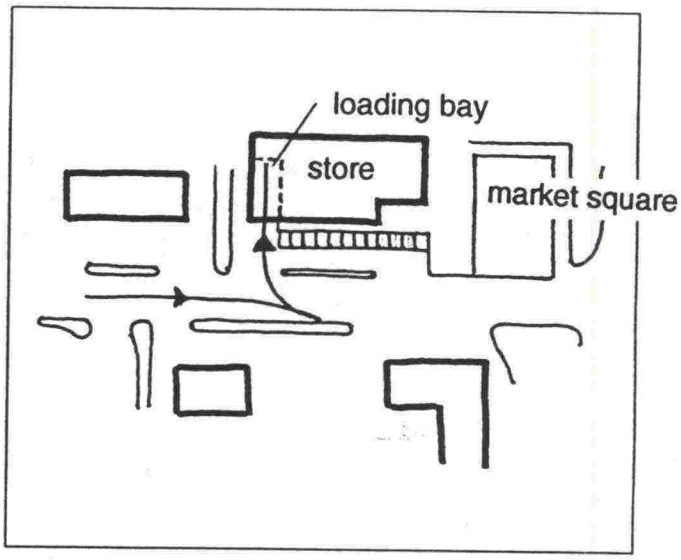
Islands should be avoided on side streets, since they greatly expand the intersection zone. The safety of bike and pedestrian traffic crossing side streets can be improved by raising the crosswalks on either the side street side or the throughroad side; the entire intersection can be elevated, too. If there is a lot of heavy traffic on the throughroad, the elevated section should besufficiently long (about 10 m). The intersection can also be narrowed to improve bike and pedestrian traffic safety (Fig. 6/55). Central islands are justifiable for busy side streets.

6.4.7 Service traffic

The service traffic in the shopping street section must be functional yet not hinder the throughroad or reduce its safety.

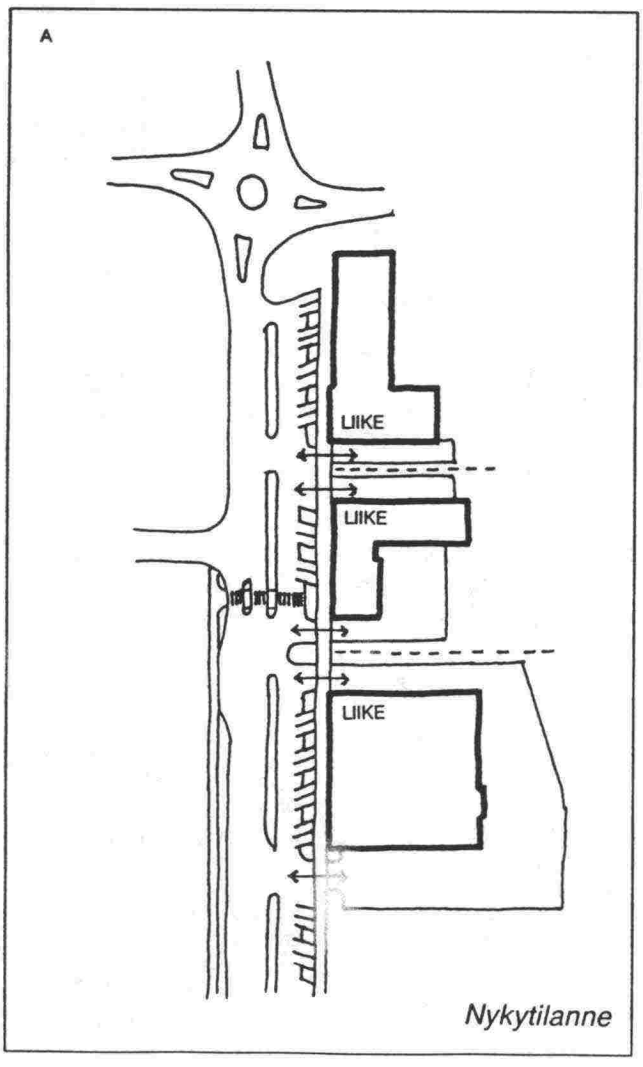
Service outlets and loading yards must be designed so that service vehicles do not have to back into them from the throughroad (Fig. 6/56). Service routes with through access should be provided for at the zoning stage, the goal being to create a service route shared by several plots, thus reducing the number of places where service traffic and bike and pedestrian traffic cross (Fig. 6/57 A-B).

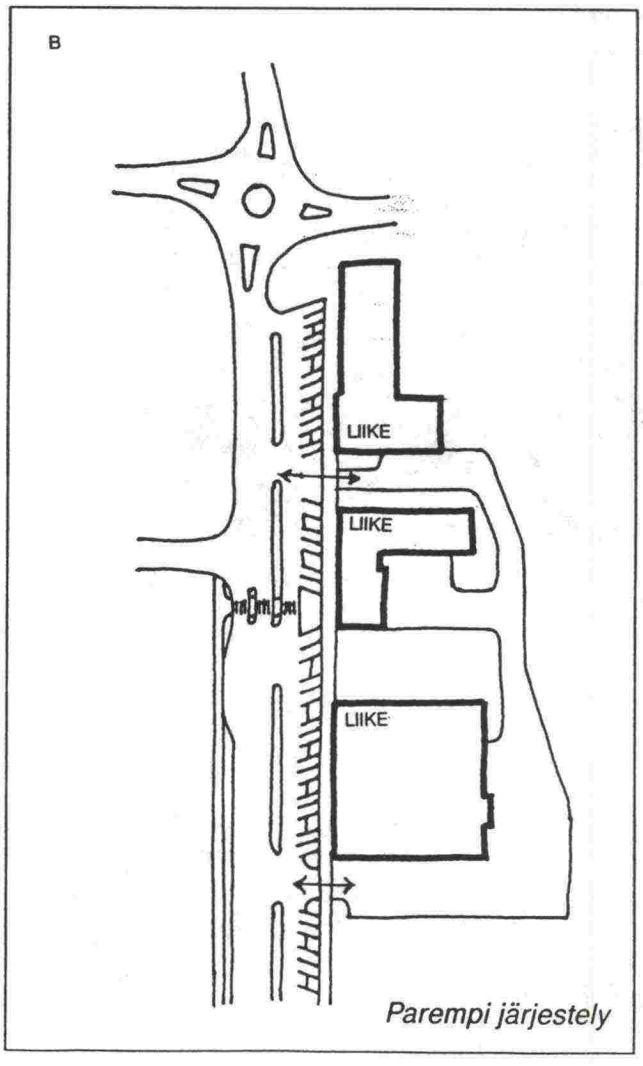
The intersections of service routes and bike and pedestrian traffic routes should be elevated on both sides in the interests of safety.



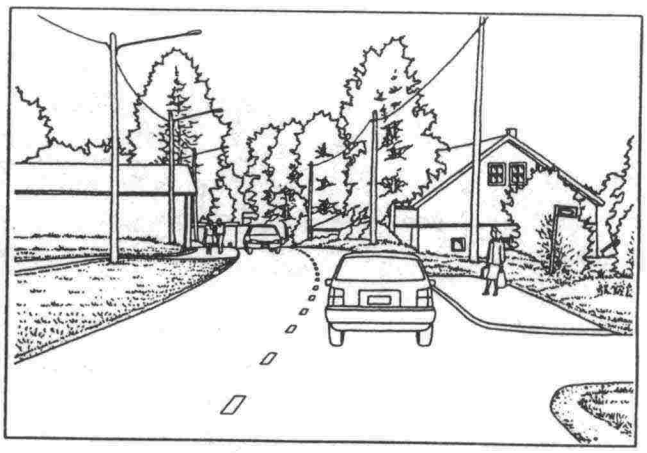
6/56. A loading bay must not be placed so that delivery vans have to back into it from the throughroad.

6/57 A-B. Using joint access roads for several plots reduces the number of crossings between service traffic and bike and pedestrian traffic.





6/58. Service traffic access routes and their functionality must be taken into account at the zoning stage; at the shopping street design stage it may be too late. Kuhmo.



6/60. A bus stop without a bay supports the vehicle speed moderation goals of the throughroad.

6.4.8 Mass transit

The bus depot should be placed in the center of the built-up area, so that bus passengers can disembark as close to the services as possible.

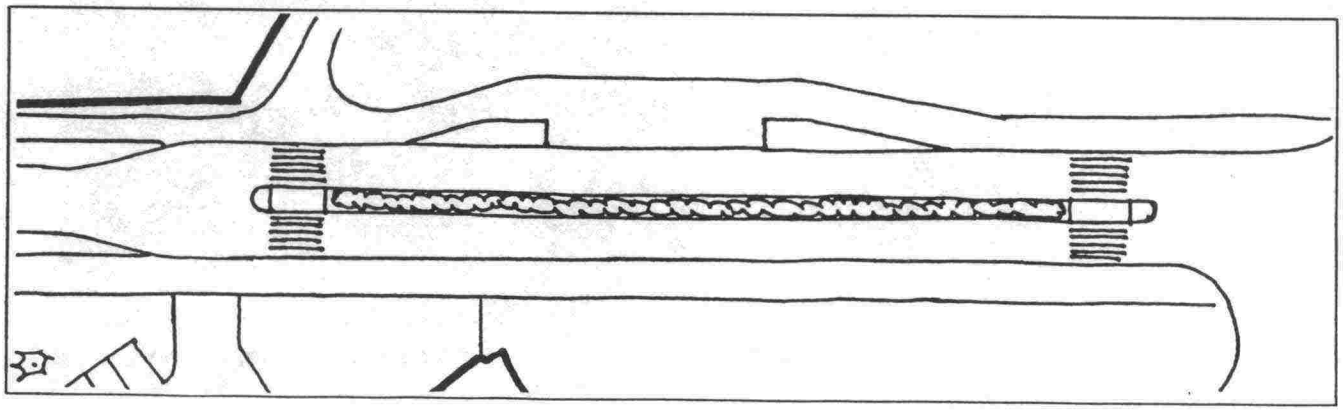
It is not necessary to provide bus stop bays in the shopping street section, because

- the disturbance caused by a bus standing in the traveled way is minimal; in any case, the bus has right of way when pulling out of the bus stop
- stopping buses are not a frequent problem, since service intervals are long and user numbers fairly low elsewhere than at the bus depot and at stops near schools
- a standing bus interrupts the traffic flow, reduces vehicle speeds and improves the status of bike and pedestrian traffic
- this arrangement is more flexible for bus traffic; moreover, it is cheaper and takes up less space.

The bus stops serving schools, health centers, etc. should be placed as close to their respective service outlets as possible and may thus require special design.

A bus stop can also act as a constraint (Fig. 6/59). The stop can be built without a bay and with a long central island to prevent any passing of a standing bus. This also improves the safety of crossing bike and pedestrian traffic.

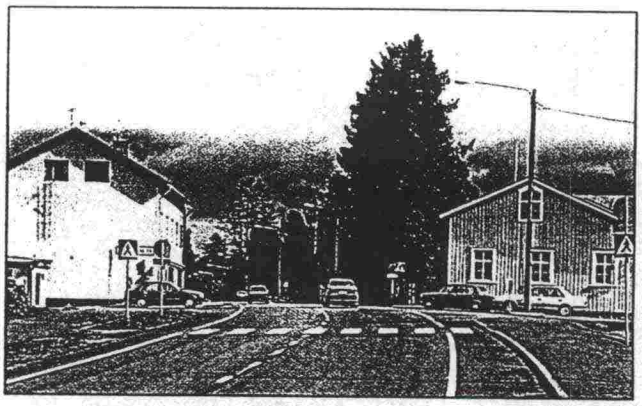
6/59. A bus stop can also act as a constraint.



6.4.9 Constraints

Keeping travel speeds low is not possible without structural constraints, unless the geometry of the road is on a very small scale. A narrow traveled way only moderates speeds at peak hours.

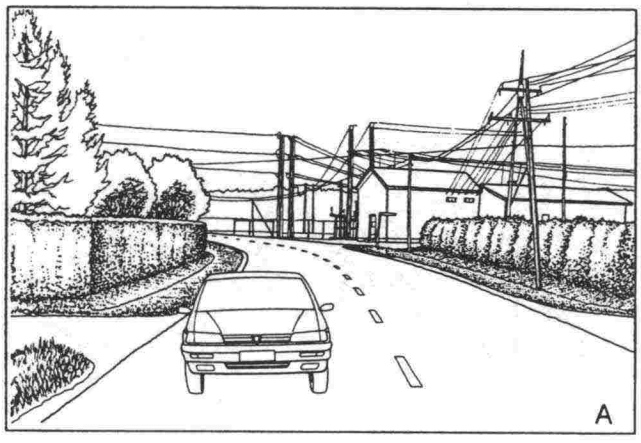
Existing gateways can also be used to moderate travel speeds; such gateways can consist of buildings or trees close to the road. Other types of constraint include wide islands, narrowings, humps or elevated traveled way sections and reductions in the scale of the road alignment. The vertical alignment of the road can also be locally converted to a smaller scale.

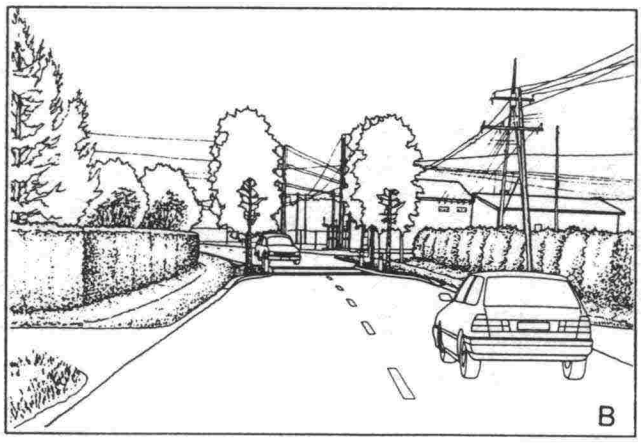


6/62. A gateway formed by two buildings is a natural constraint. Pielavesi.

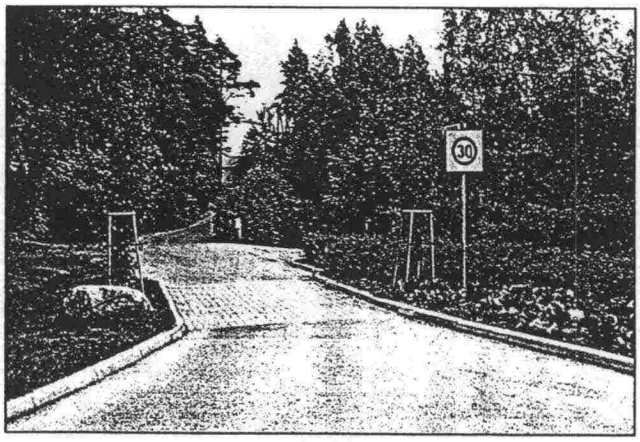
To keep vehicle speeds at the desired level, constraints must be built at intervals of no more than 100 m.

The type of constraint to use should be chosen according to the road section in question. The main principle is that in sections where buildings are pulled back from the road (approach sections and some church village sections) large-scale constraints can be used: central islands, road realignment and alterations to road geometry. Small-scale, more urban constraints such as humps and barriers can be used in shopping streets and market places.





6/61 A-B. A two-sided narrowing as a constraint at the beginning of the village highroad.



6/63. A constraint consisting of a narrowing and a hump. Joutseno.

The essential point is to design the constraints as an integral part of the traffic arrangements and environment in each road section - for instance, raising the level of the market place or placing a wide island on a school route. Structures that do not fit into the environment, such as speed humps, should be avoided.

The spatial organization of and views from the throughroad must be considered in choosing and placing constraints. For example, a wide median with trees can be used to delimit the throughroad or provide a missing gateway. On the other hand, a clearly defined street space such as a market place surrounded by buildings must not be broken up with such a median. Also, planting must not obscure important views of buildings important to the villagescape.

The constraints must be designed so that they are functional and visible in all seasons and under all lighting conditions.

6.4.10 Lighting

Lighting is of utmost importance to traffic safety in Finland; half of all PIF accidents involving pedestrians occur in the dark. Lighting design should aim at traffic safety but also depends on road segmentation. Parameters that may be varied from section to section include the height and placement of lighting supports, the lighting fixture type and model, the light intensity, and color reproduction. Changes in lighting must not lead to a chaotic traffic environment. Any changes must be supported by changes in the villagescape.

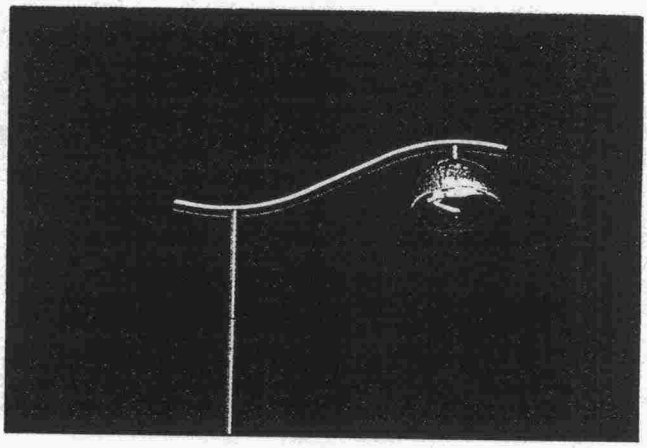
The lighting in approach sections and other spacious road sections must be designed to suit the traffic. Extra lighting can be provided for bike and pedestrian traffic crossing points in approach sections, even if this results in an irregular lighting support interval.

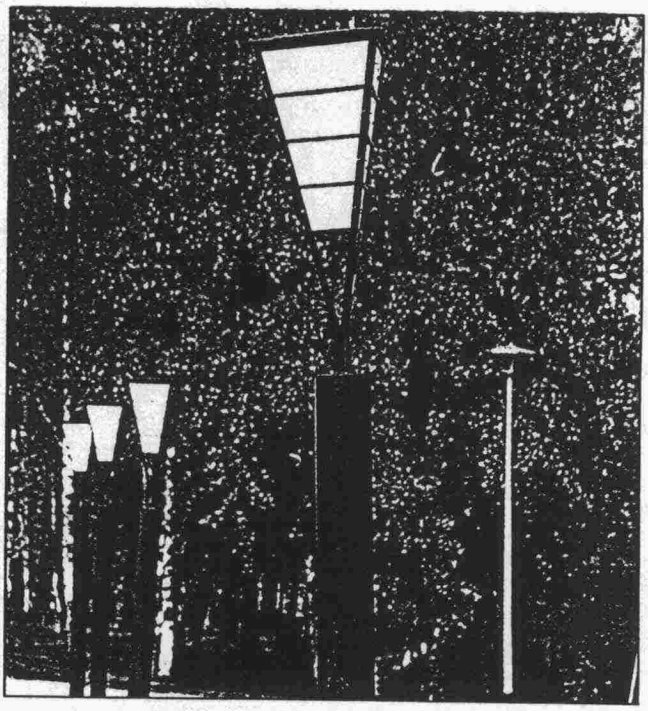
In important areas such as shopping streets and market places, the lighting must always be designed on the terms of the local traffic and environment. Especially in built-up areas with low traffic volumes, the market place can be emphasized by interrupting the regular road lighting at the square and highlighting its shape.

Crosswalks and important pedestrian areas must be provided with adequate light.

Gateways (such as a building or group of trees important to the villagescape) can be highlighted with spotlights. Under certain conditions, traffic constraints can also be highlighted.

A separate report on lighting is being prepared by the Finnish National Road Administration (FinnRA).





6/64-65. Special lighting fixtures designed for rural BUAs: a road lamp and a parking lot lamp.

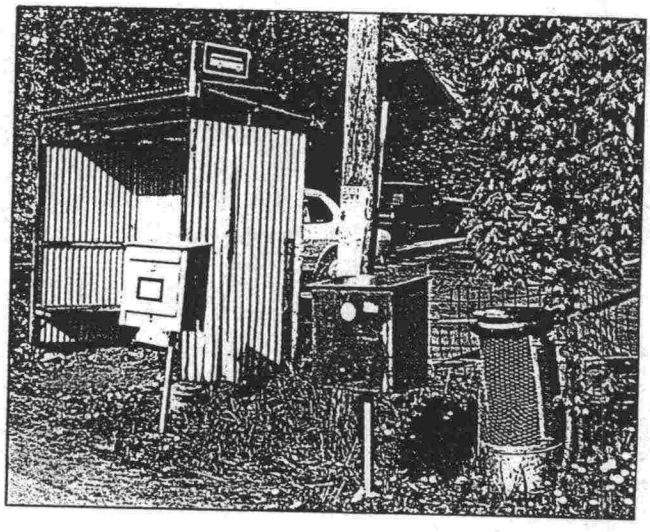
6.4.11 Road equipment and street furniture

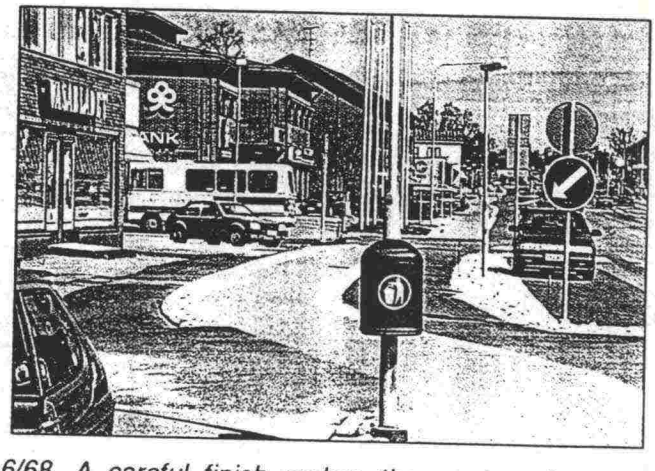
Apart from lighting, the road equipment and street furniture of important throughroad sections such as shopping streets and market places often include bus shelters, benches, retaining walls and planting structures, barriers, and garbage cans. Furthermore, any advertising materials and comparable structures placed by stores and businesses have a great effect on the villagescape. One example of such structures is the summer terraces built by many bars and cafés. In many built-up areas, many of the centrally located stores are now part of retail chains which require the windows to be covered over. Even though this element often seems visually overwhelming in the villagescape, it does not excuse neglect in the design of street furniture.

In designing and choosing street furniture, the following principles should be observed:

The furniture selected should be durable, and streamlined in design. Pastiche, i.e. furniture that transposes old elements (hipped roofs and so on) and materials to new functions, should not be used; this approach has invariably proved a failure.

Unnecessary furniture should be avoided. For example, the traffic arrangements and the divisions between different types of traffic should be designed so that separate planting boxes are not needed. Underground structures may require planting boxes, in which case their appearance must be carefully considered. The point is that the boxes should draw attention to the plants they contain, not to the structures supporting the boxes.





6/68. A careful finish makes the road environment look well designed. Närpiö.

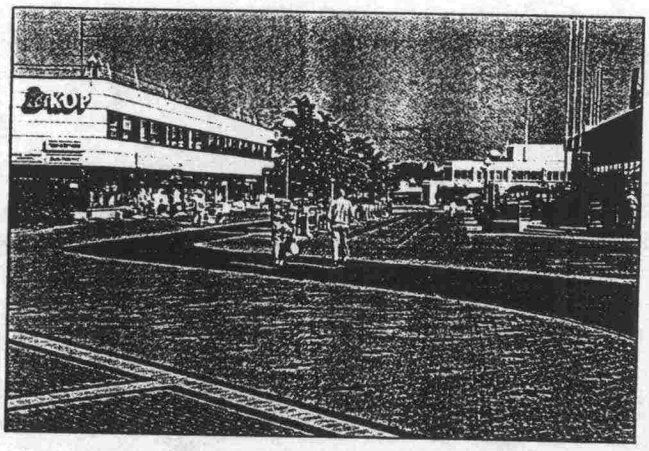
6.4.12 Surface materials

The most recent throughroad plans have attempted to improve the appearance of the final result by using various kinds of concrete block paving. Paving stones can produce a neat effect; however, the amount, quality and design of the paving must, like all other elements in the road environment, be derived from the environment and the character sought for each road section. Extensive stone pavements are best suited for densely built shopping streets and market places. In smaller rural built-up areas, stone pavements should be used only to a limited extent and with great care. Even in larger areas, the suitability of concrete block paving in historically valuable places like church plazas is questionable. Often, natural stone or a neat gravel field is a better idea.

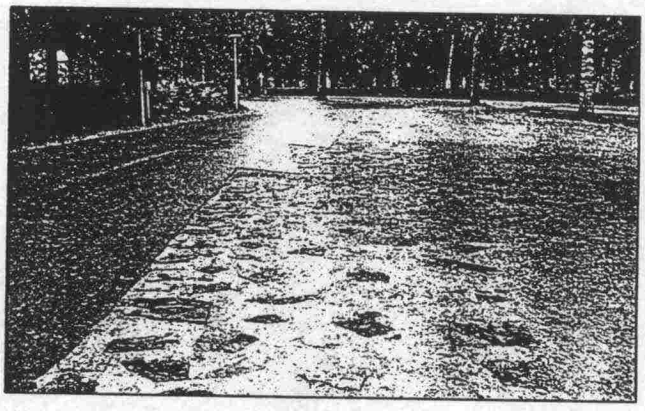
In designing concrete block pavements, excessively small and complicated or multi-colored patterns should be avoided.

It is more important to have good quality workmanship in the environment than a wealth of surface materials. The field work for this project uncovered many poorly laid pavements that had begun to deteriorate due to stress caused by seasonal changes and maintenance equipment. An expensive pavement can thus quickly become unattractive and difficult to maintain. Particular attention should be paid to the durability of sidestrips between the traveled way and bike and pedestrian traffic paths. If curbstones are not used, the sidestrip must be strong enough to withstand vehicles.

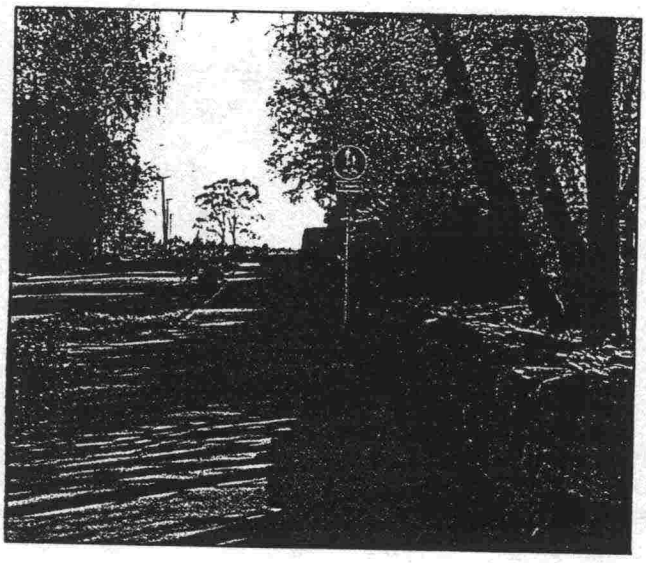
Slipways and other level changes must be carefully examined in the design process. The main principle is to design the vertical alignment of the road so well in relation to the environment that the number of retaining walls and problematic slipways is as low as possible. Access for the disabled must always be provided.

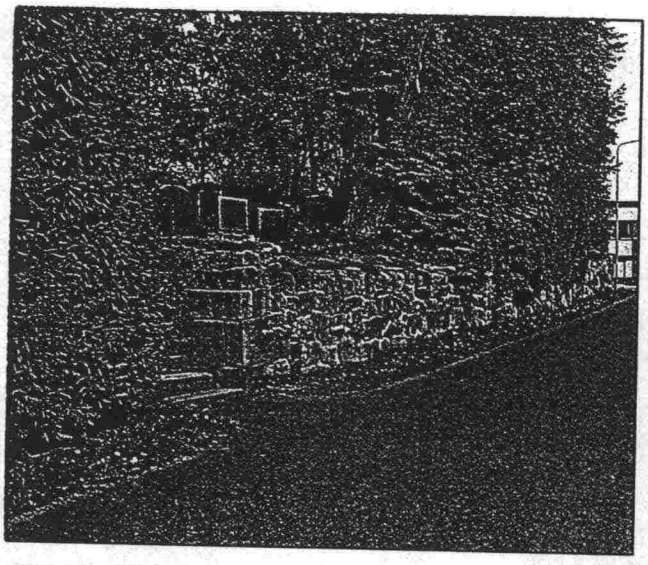


6/69. A market square paved with high-quality durable material suits a more urban villagescape well. Turenki.



6/70. This surface was made from modest materials and fits well and timelessly into its environment. Multia.

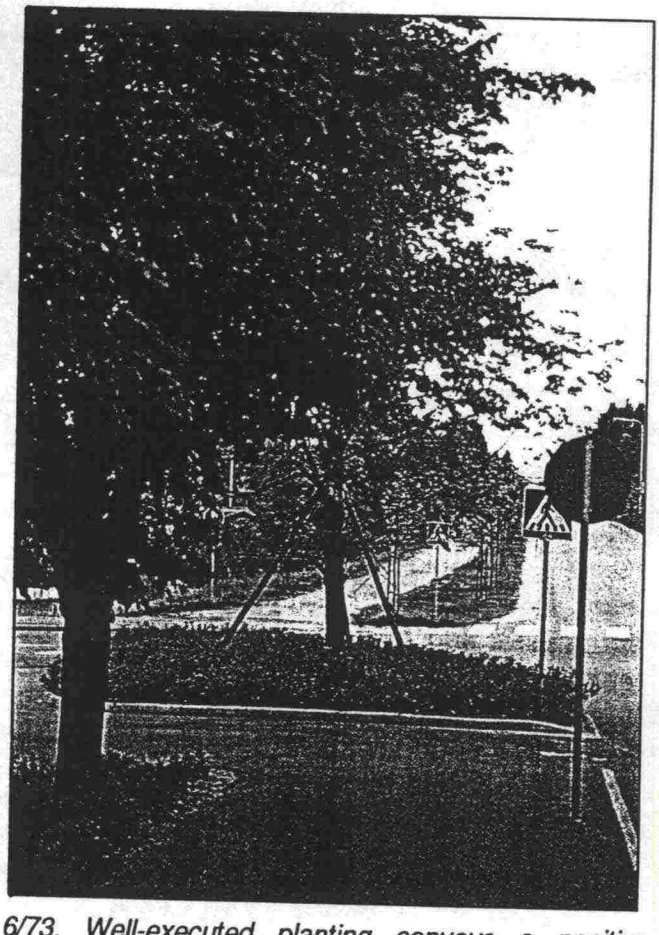




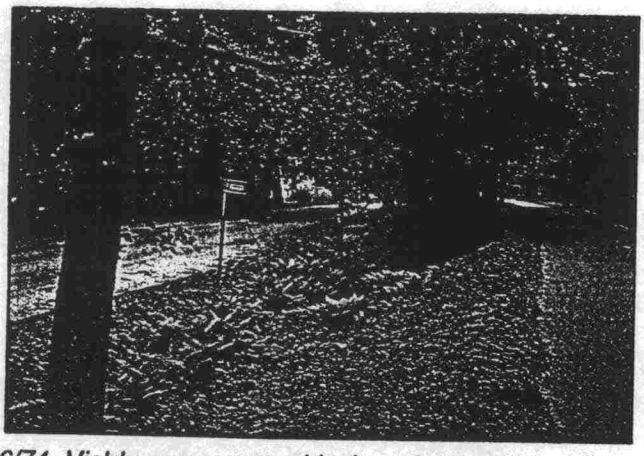
6/71-72. The beauty of a churchyard wall can be underscored with a narrow strip of green. Pomarkku, Mynämäki.

6.4.13 Planting

The principles for planting shrubs and trees must be derived from the existing environment and its development goals. Different concepts can be applied: rows of trees, groups of trees or shrubs, or individual trees. The plantings must also be tied in with the environment laterally; in particular, regular rows of trees should not form a 'tunnel' isolated from the rest of the area. Boulevards created with rows of trees are strong elements in the urban structure, and as such are better justified in larger and more citylike areas. However, even there the design process must clearly establish what the area's structural hierarchy is and what the role of the new boulevard in the urban structure would be.



6/73. Well-executed planting conveys a positive image of the road environment. Heinävesi.



6/74. Viable greenery and lush undergrowth has been preserved by placing the bike and pedestrian traffic path away from the traveled way. Hirvensalmi.

Trees in good condition must always be retained. It seems to be the case quite often that ways of preserving existing trees are not fully thought out. A typical case might be one where well-developed edging trees on the verge are cut down, leaving trees with weak tops that have grown in the shade.

The greenery analysis for the road plan should indicate, for each item, the type of tree, its placement, the significance of the tree in the villagescape, and its condition and viability.

New planted saplings should be large enough, and the species used must be durable. The origin of the saplings, the quality requirements for them, the principles for planting them, and the requirements for the ground area concerned must be clearly defined in the contract documentation for the planting, to enable efficient quality control.

Creating a median with planting must not be an end itself. The greenery on plots and the trees edging the road often constitute a viable environment that should not be undermined with new planting.

6.4.14 Noise

On downtown roads in rural built-up areas, noise is usually not a problem, due to the low travel speeds and traffic volumes. Reducing vehicle speeds reduces traffic noise.

Creating a through traffic route in the BUA center always creates a noise problem, and tends to call for noise barriers. Noise screening is extremely difficult if not impossible to fit into the villagescape in a rural BUA.

According to the FinnRA policy, noise screening is not implemented if it will create problems that exceed the benefit of the screening. Such problems may relate to the landscape or villagescape or to restricted land development possibilities.

6.4.15 Traffic management

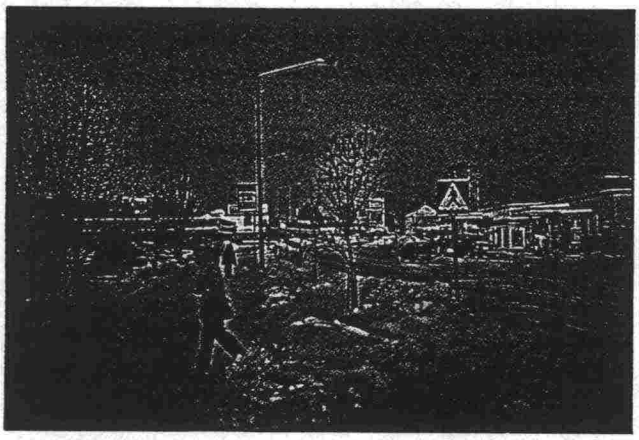
Low travel speeds make the traffic environment easier to perceive. Thus, fewer control devices are needed. The traffic environment should be designed so as to minimize the number of traffic signs needed.

Heavy control structures (e.g. portals) should be avoided. The traffic signs in BUA centers can be small.

In an urban street network, constraints such as humps or narrowings are usually not indicated with a traffic sign if the speed limit is 30 kph. There is no fixed practice yet for the 40 kph speed limit. More precise instructions on traffic sign use in connection with constraints (e.g. a 'road narrowing' sign) will be issued in more detailed design directives for different throughroad sections.

6.4.16 Maintenance

Maintenance demands must be taken into account in the design. However, the maintenance equipment considered does not necessarily have to be FinnRA's; maintenance services can be bought from a company using smaller equipment or from the municipality.



6/75. Winter maintenance requirements must be taken into account at the design stage. Orivesi.

6.4.17 Costs

The cost of environment-oriented throughroad designs varies greatly, depending on the problems and development goals of the built-up area concerned and the measures required. The design process will in any case be more expensive than conventional road layout design, since more experts will be needed, and open planning increases costs.

Implementation costs can be kept down by applying the following design principles:

* Preserving small-scale alignments and a narrow cross-section
- no large-scale work needed
- no land purchase costs

* Local roads with low traffic volumes do not need bike and pedestrian traffic paths
- no expenditure on building bike and pedestrian traffic paths
- low constraint construction costs

If the vertical alignment of the road has become too high in relation to its surroundings, lowering it can cause considerable costs. However, these costs can be reduced by lowering the vertical alignment only where absolutely necessary.

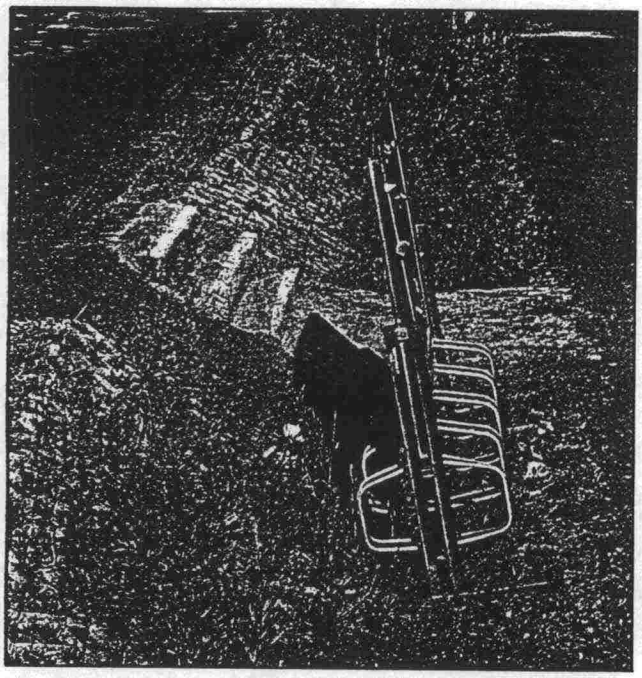
Careful consideration in the use of surface materials will cut costs significantly.

Throughroad improvement costs are greatest when the entire street space must be reorganized and releveled, as in Kauhajoki. The costs are lowest when the goals can be reached with minor measures that do not change the present alignment of the road, as in Sumiainen.

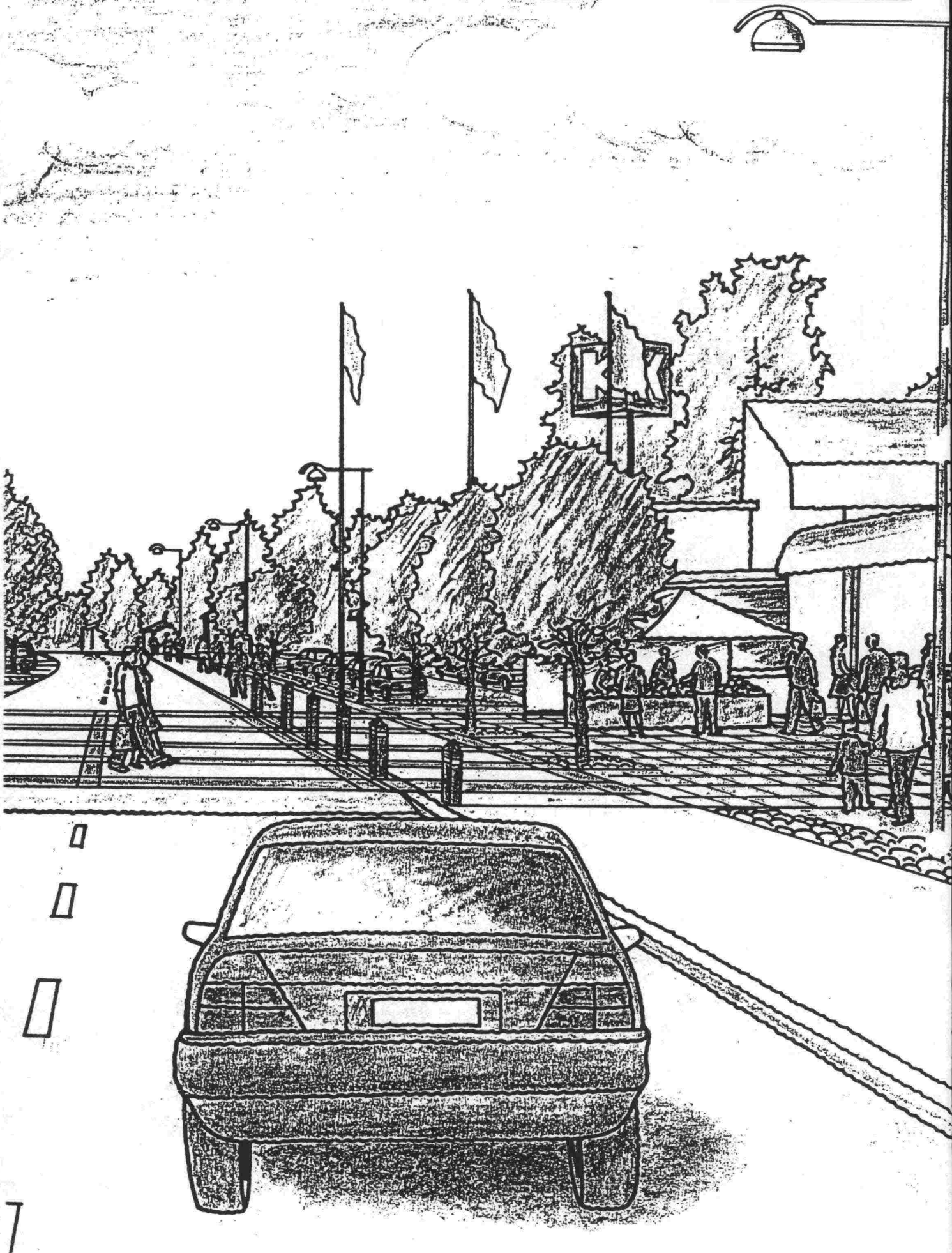
Planting and maintaining greenery raises the cost of environment-oriented throughroad design, but on the other hand the preservation of the environment, including viable vegetation, in the design process cuts costs.

Winter maintenance is often more expensive, since the snow has to be carried away and the largest available snowplows cannot be used. On

the other hand, narrow traveled ways mean there is less snow to remove.



6/76. A road must be designed so that maintaining its environment is not unreasonably difficult. Ii.



6.5 Case studies

The purpose of these case studies is to demonstrate the goals and design principles of throughroad design. The examples contain ideas suitable for different kinds of built-up area.

6.5.1 Sumiainen

Environmental features are the starting point

Sumiainen is one of the most beautiful church villages in Finland, forming a long highroad along a ridge on the eastern shore of Lake Keitele. The church is located on a narrow isthmus between two lakes at the southern end of the village.

The quality of the villagescape rests on the totality, which is more than the sum of its parts. The most important properties for the villagescape of the central highroad are the subtle details and small scale. The buildings are fairly small, no more than two stories high along the main highroad, creating a uniform building stock.

A new business building has been built on Taipaleentie road; its yard and sausage stand are symptoms of a development that has undermined the unique characteristics of nearly all the villages in Finland. The row houses along the road have been slightly pulled back.

Highway 645, which runs through the village, follows the terrain closely and thus has many small curves and hills. The section south of the church is the only long straight stretch. Not much work has been done to correct the geometry of the road, which fits in well with the terrain, the buildings, and the vegetation. The level of the road has been elevated along a short section north of the church.

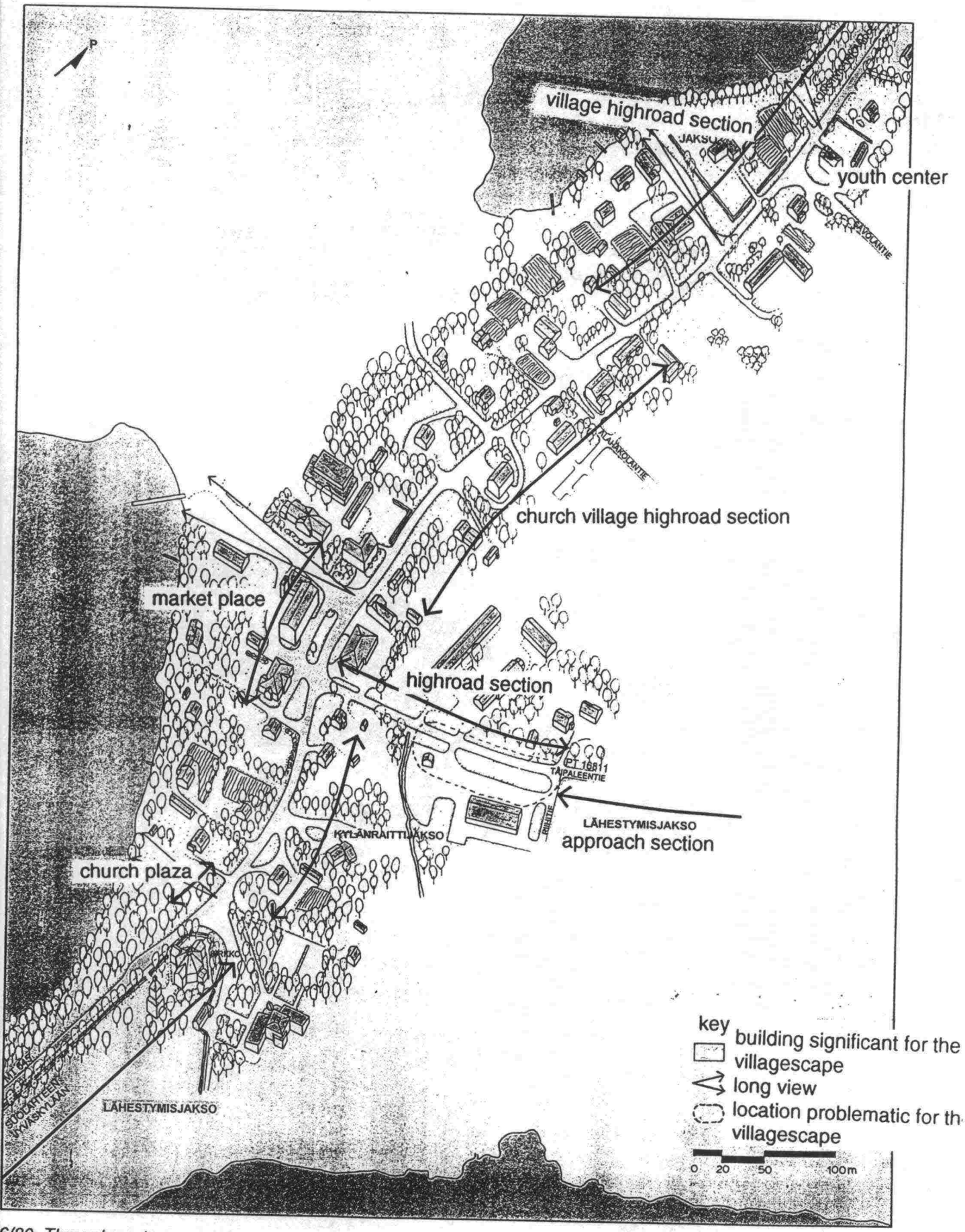
The focus of the village is the market square surrounded by buildings in front of the municipal offices. The plots are green; trees form a significant part of the villagescape.

Traffic features

Both highway 645 and Taipaleentie (local road 16811) are designated minor roads in the national road network. In the area road network, they are service center thoroughfares.

6/78. Sumiainen church village 1:20,000 and accidents in 1987-91.

6/79. The approach section seen from the center.

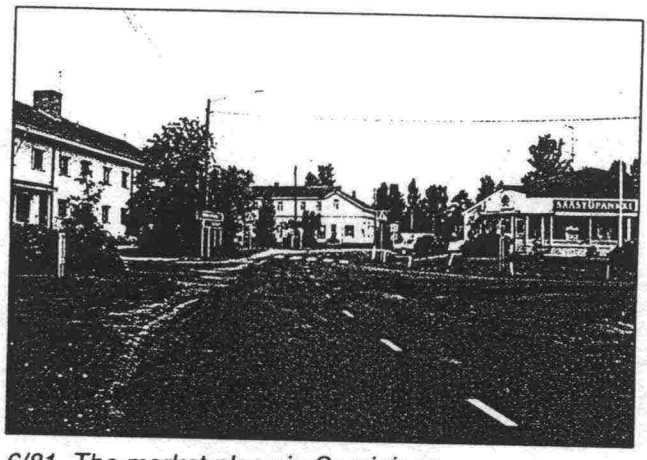


6/80. Throughroad segmentation in Sumiainen.

The traffic volume on both roads is slight (about 500 to 900 vehicles per day). Goods traffic accounts for 10% of this.

Between 1987 and 1991, the police were notified of only four traffic accidents, three of which were single accidents. One was a PIF accident.

The only traffic problem is the lack of safety for pedestrians, as there are no bike and pedestrian traffic routes or sidewalks.

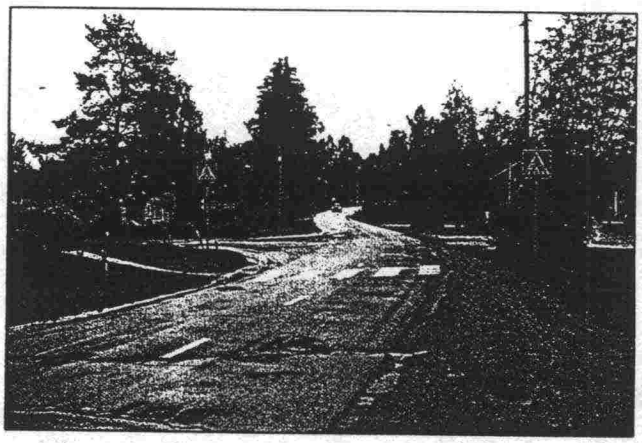


6/81. The market place in Sumiainen.

Throughroad segmentation

Approach sections:

- from the north to the vicarage
- from Taipale to Riihitie road
- from Suolahti to the church
- the approach sections are highway-like, the road being separate from the built-up environment
- the approach sections witnessed had three accidents (two single accidents and one turning accident)
- traffic volume is low
- very little bike and pedestrian traffic along the roads



6/82. View from the market place toward the church in 1992.

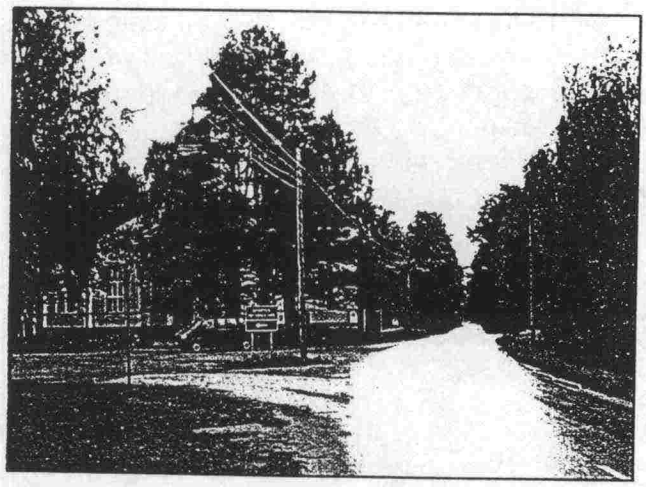
Highroad sections:

- on the highroad sections, some buildings adjoin the road and some are pulled back
- the views are extremely variable; trees and buildings alternate
- due to the presence of services and schools, there is more bike and pedestrian traffic both along and across the road than on the approach sections
- no traffic accidents have occurred on the highroad sections that have come to the knowledge of the police

Market place:

- the village is so small that it does not have a shopping street as such
- instead, the focus of the village is an exceptionally well defined market place

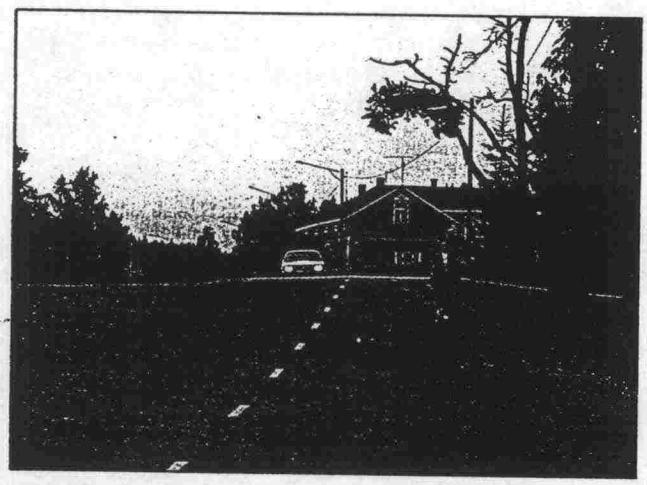
6/83. View from the market place toward the church in the early 1930s.



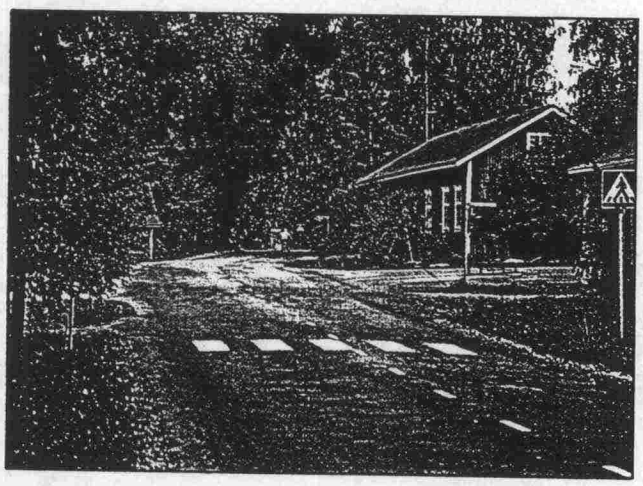
6/84. The church plaza in Sumiainen.

the market place has the greatest volumes of bike and pedestrian traffic across the road

- one traffic accident has occurred in the market place (vehicle overturned by drunk driver in the road)



6/85. The church village highroad section in Sumiainen.



6/86. The church village highroad section in Sumiainen, intersection of Alahakolantie. The old buildings form a gateway at the boundary of the church village highroad and the village highroad.

Goals

Assuming that the overall goal is to preserve the character of the environment of Sumiainen church village, the goals and basic design principles should be established as follows:

1. No alterations should be made to either the horizontal or the vertical geometry of the road; all curves should be retained. In certain places the road should be lowered to match the terrain. Some straightened curves should be restored to their original state.

2. No separate bike and pedestrian traffic path or elevated sidewalk should be constructed in the central part of the village (from the church to the youth center). If a bike and pedestrian traffic route should prove necessary, it should be placed completely apart from the road and fitted discreetly into the environment.

3. The market place should be treated as an open space completely independent of the road.

4. Urban details should be avoided. No concrete bollards, no paving stones, no colored concrete tiles. Elements that can be used may include planting, gravel surfaces or asphalt. Any paving stones used should be low and natural stone.

In other words, the traffic problems should be very carefully analyzed and the solutions sought should be locally viable and suit the sensitive environment. The main aim should be to do as little as possible.

Vehicle speed levels should be lowered to improve the safety of bike and pedestrian traffic.

Design procedure

The basic requirement is that the road designer, zoning planner and environmental designer all cooperate in the design process. All design proposals must be examined on site and, if necessary, marked out in the terrain so clearly that even outsiders can visualize the change(s) that the design would entail.

The development plan for areas along the highroad does not conform with the goals presented here, so it should be revised as part of the design process.

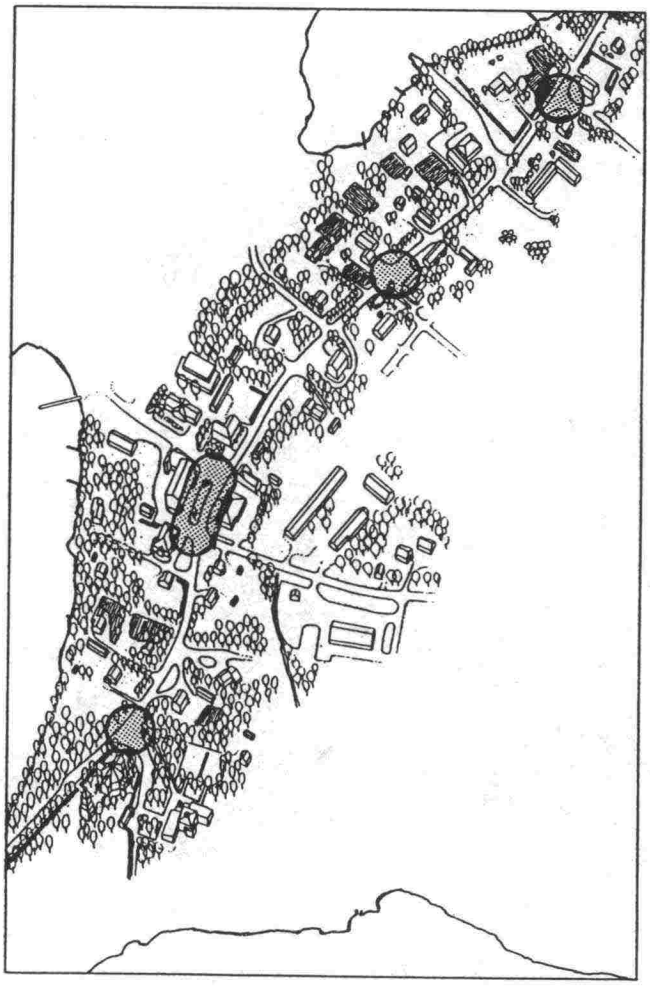
Design concepts

The shortcomings in pedestrian safety will be coped with by reducing the motor-vehicle speed limit to 30 kph between the church and Savelantie road. This speed limit will be supported with structural features that demonstrate the feasibility of the speed limit and help drivers observe it. When these designs are implemented, a separate bike and pedestrian traffic path will not be needed. A bike and pedestrian traffic path set apart from the road can be built south of the church and north of Savelantie.

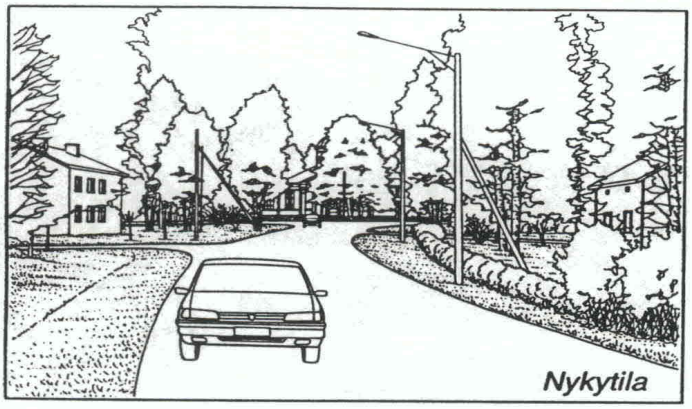
The structural features acting as speed constraints are (Fig. 6/87):

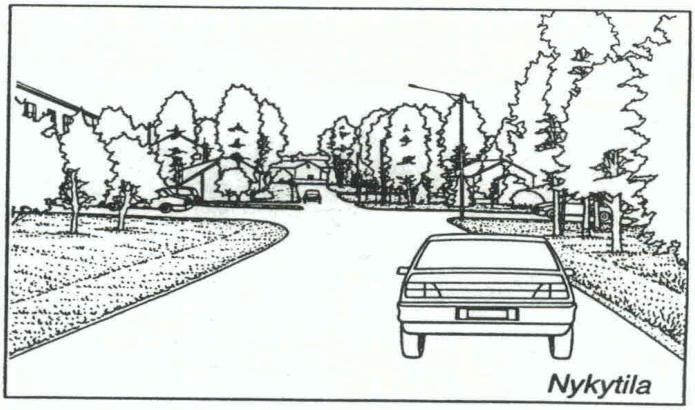
- subtle realignment of the road next to the church (Figs. 6/88-90)
- raising the level of the market place in front of the municipal offices (creating a hump, Fig. 6/94)
- creating a central island on the small market place at Alahakolantie (Figs. 6/91-93)
- placing a narrowed intersection at Savelantie (Figs. 6/95-96)

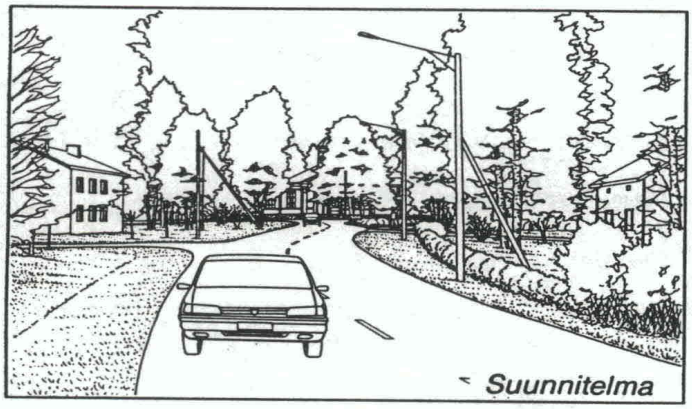
The old Kirkonmäki hill will be reinstated by lowering the level of the road to the north of the church. The traffic on the market place will be discreetly reorganized for example by removing the vehicle access lane in front of the municipal offices entrance.

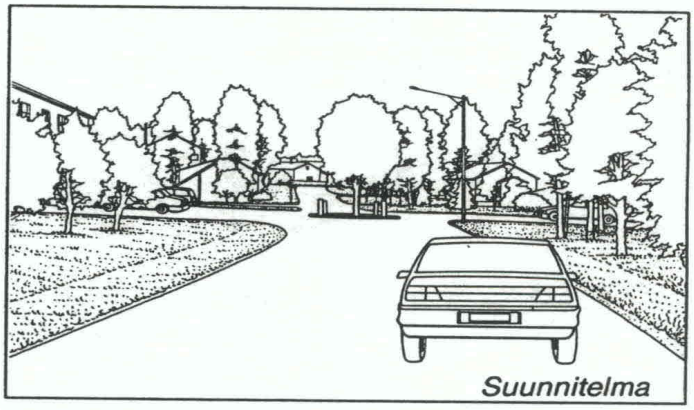


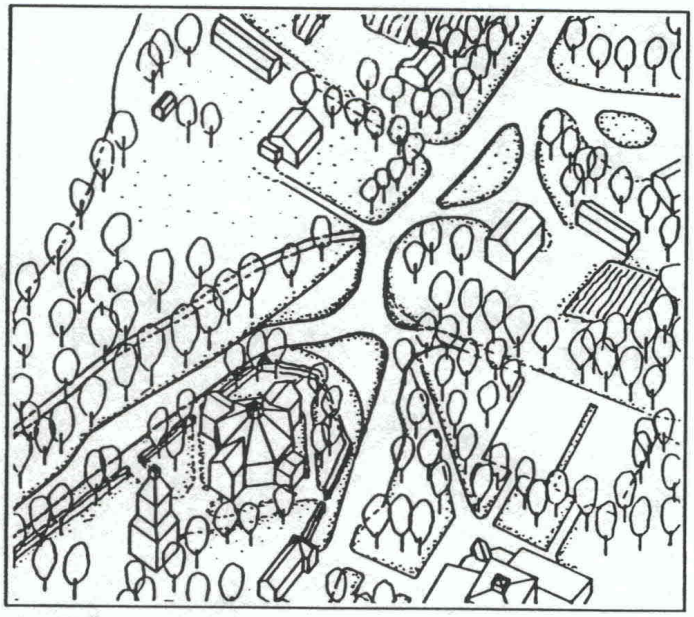
6/87. Placement of constraints in Sumiainen.



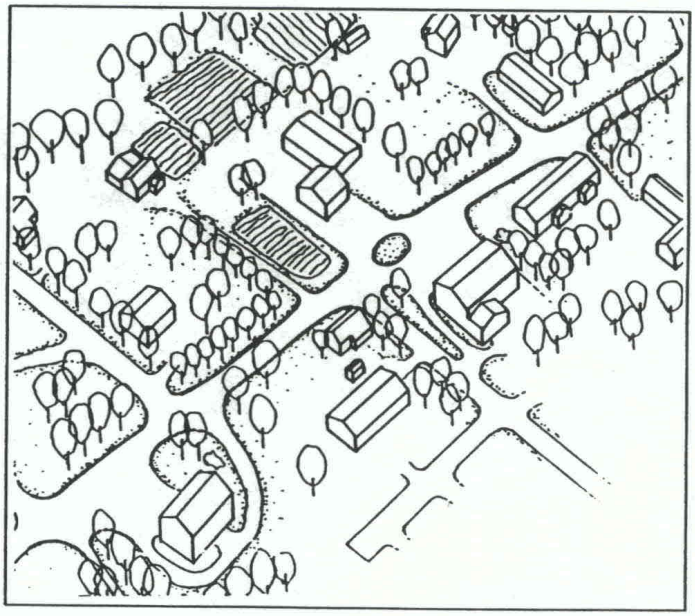




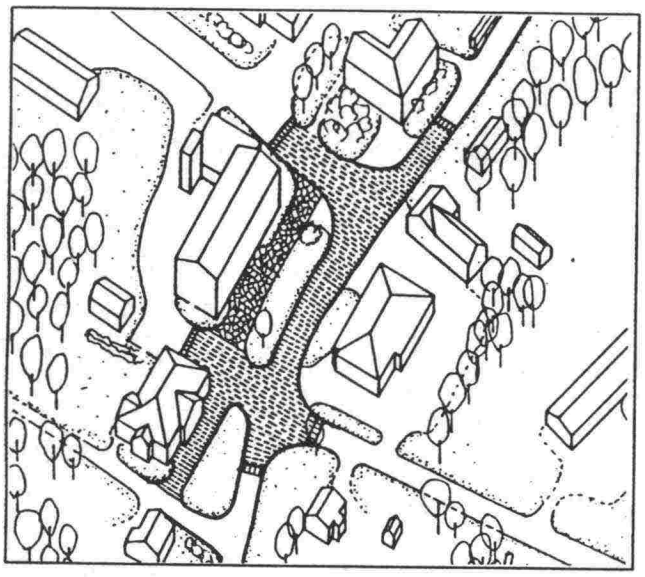




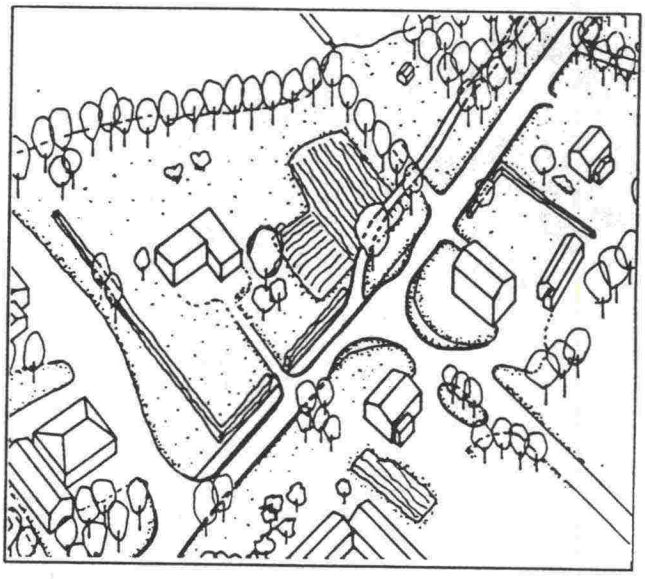
6/88-90. Small-scale constraint in the church plaza.



6/91-93. An island acting as a constraint near the stores in the church village highroad section.



6/94. The elevated market place (shaded) and new paving in front of the municipal offices.

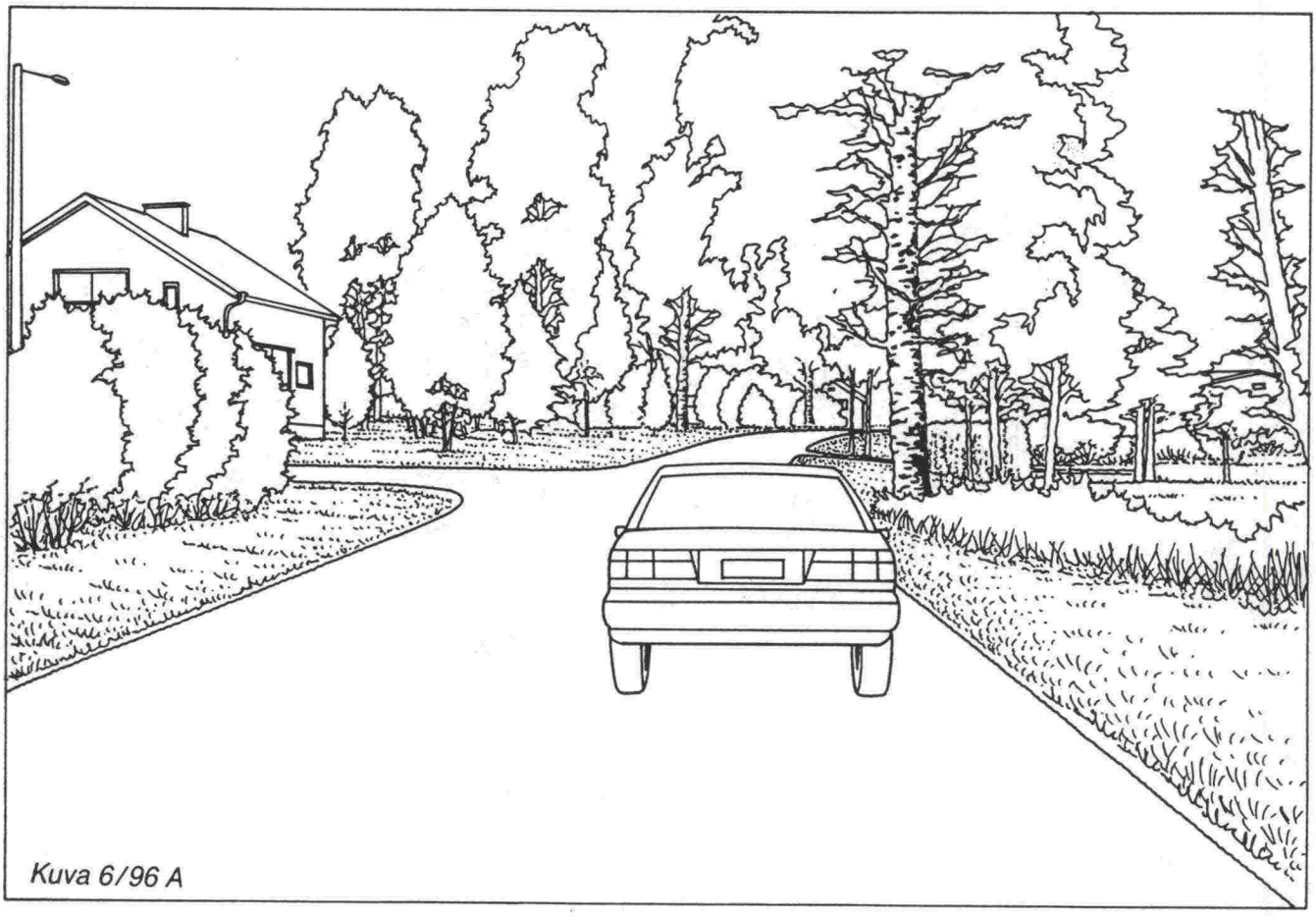


6/95. A narrowed intersection at the youth center.

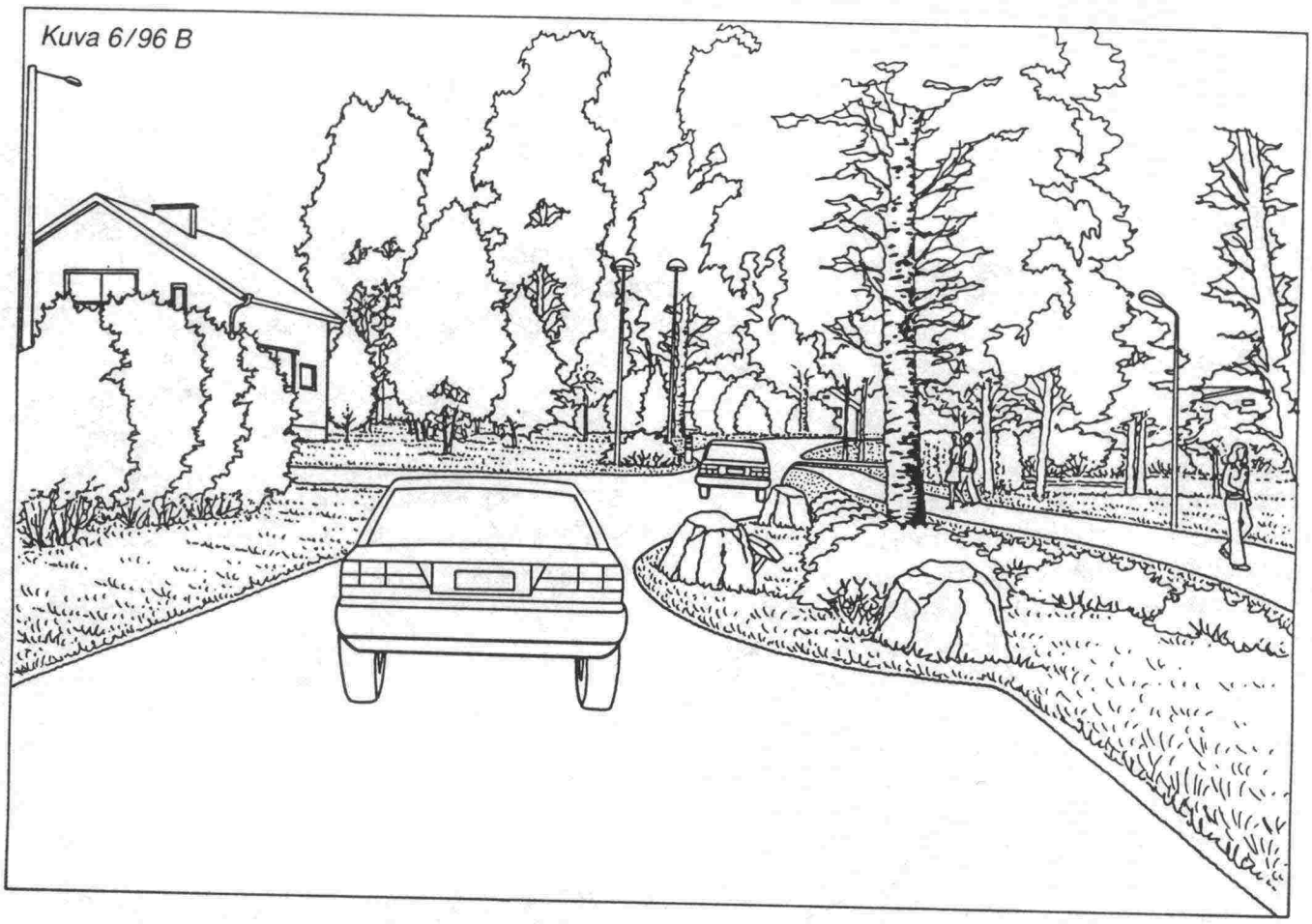
6/96A. Perspective view of the present situation.

6/96B. Perspective view of the plan, summer.

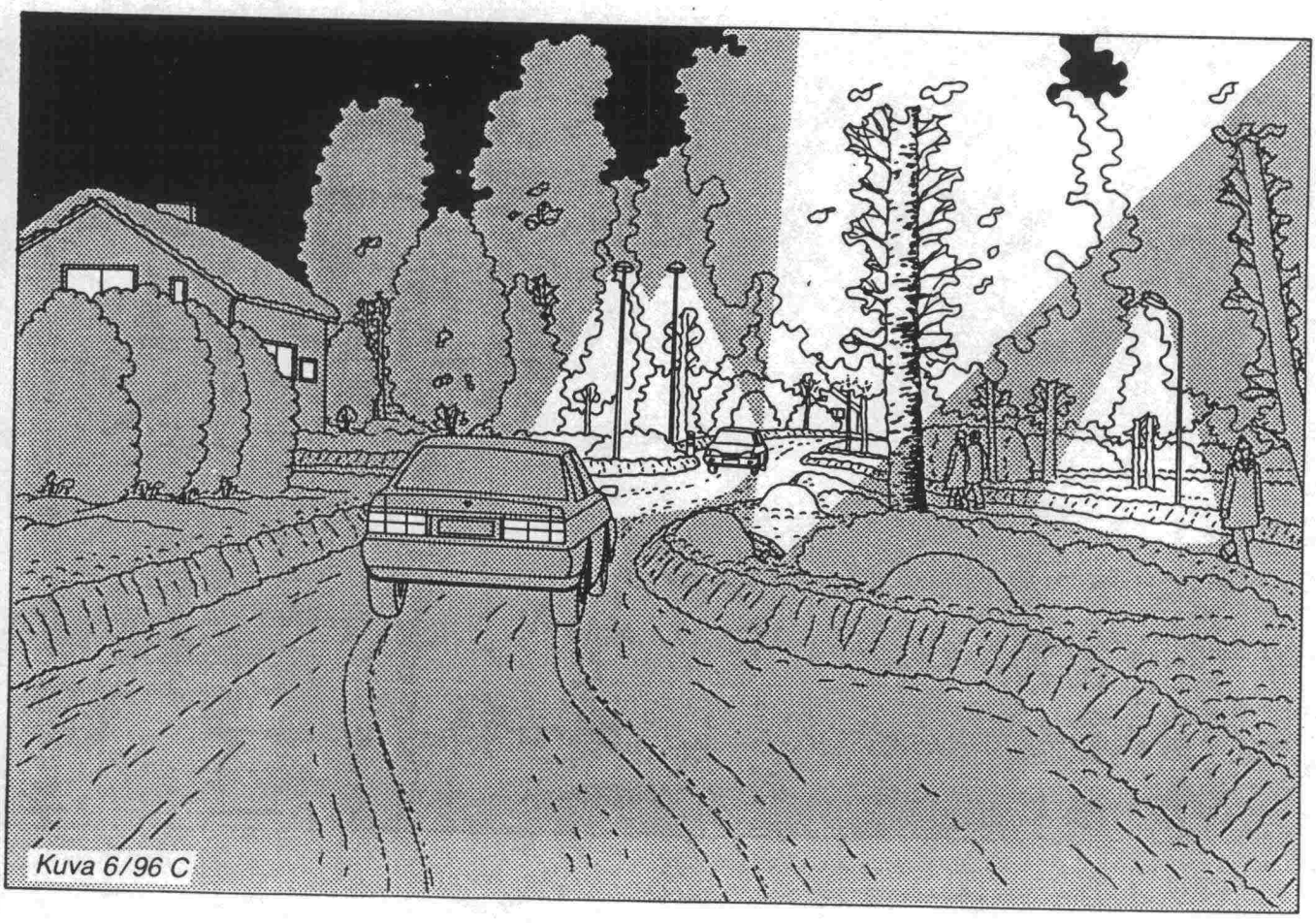
6/96C. Perspective view of the plan, winter night.



Kuva 6/96 A



Kuva 6/96 B



Kuva 6/96 C

6.5.2 Vihanti

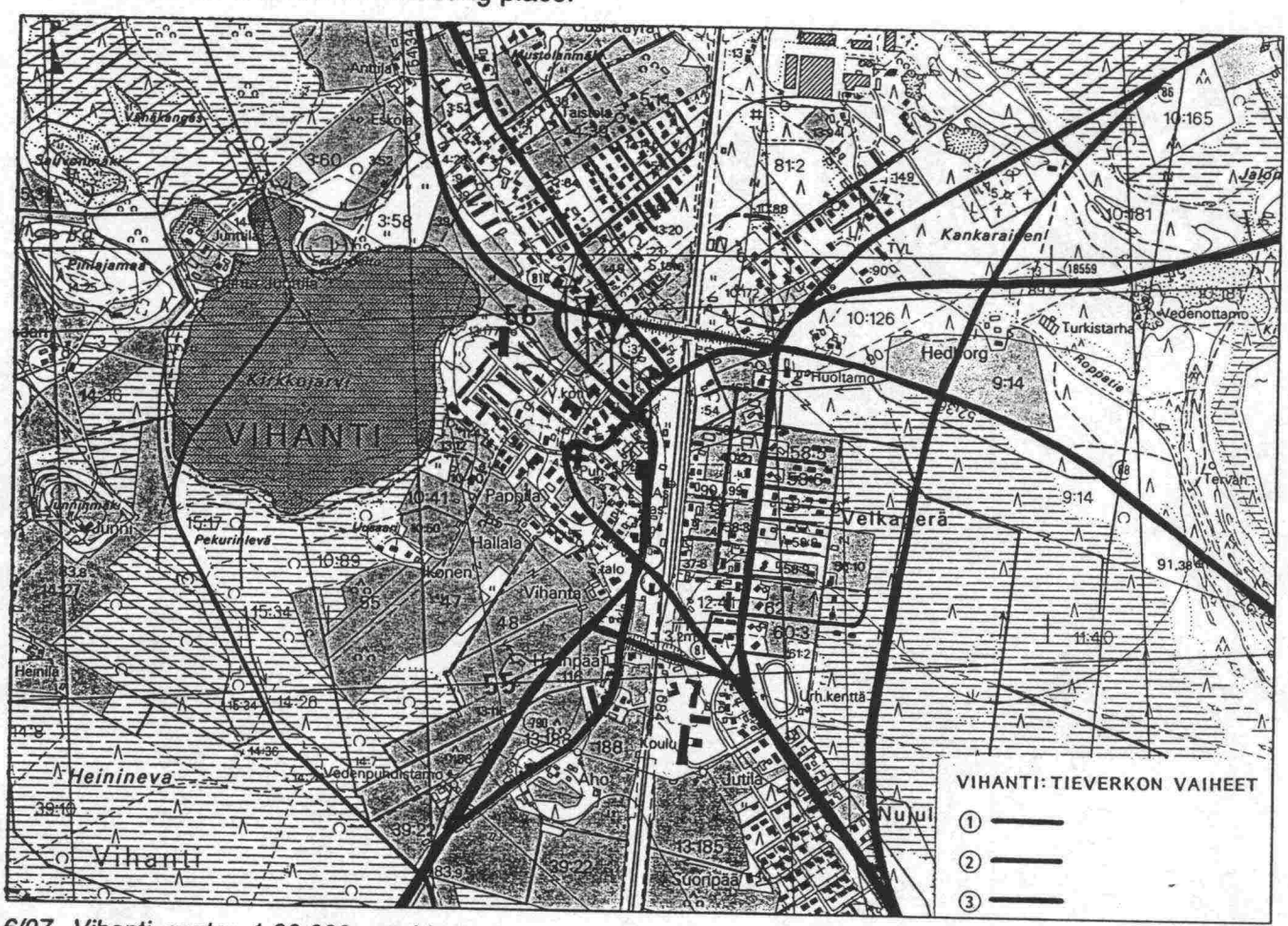
Throughroad design basis

Vihanti is a small rural built-up area (population about 1,000) with a slow growth rate. No great changes are expected in the area's development. The structure and environment show the features and layers typical of a small church village.

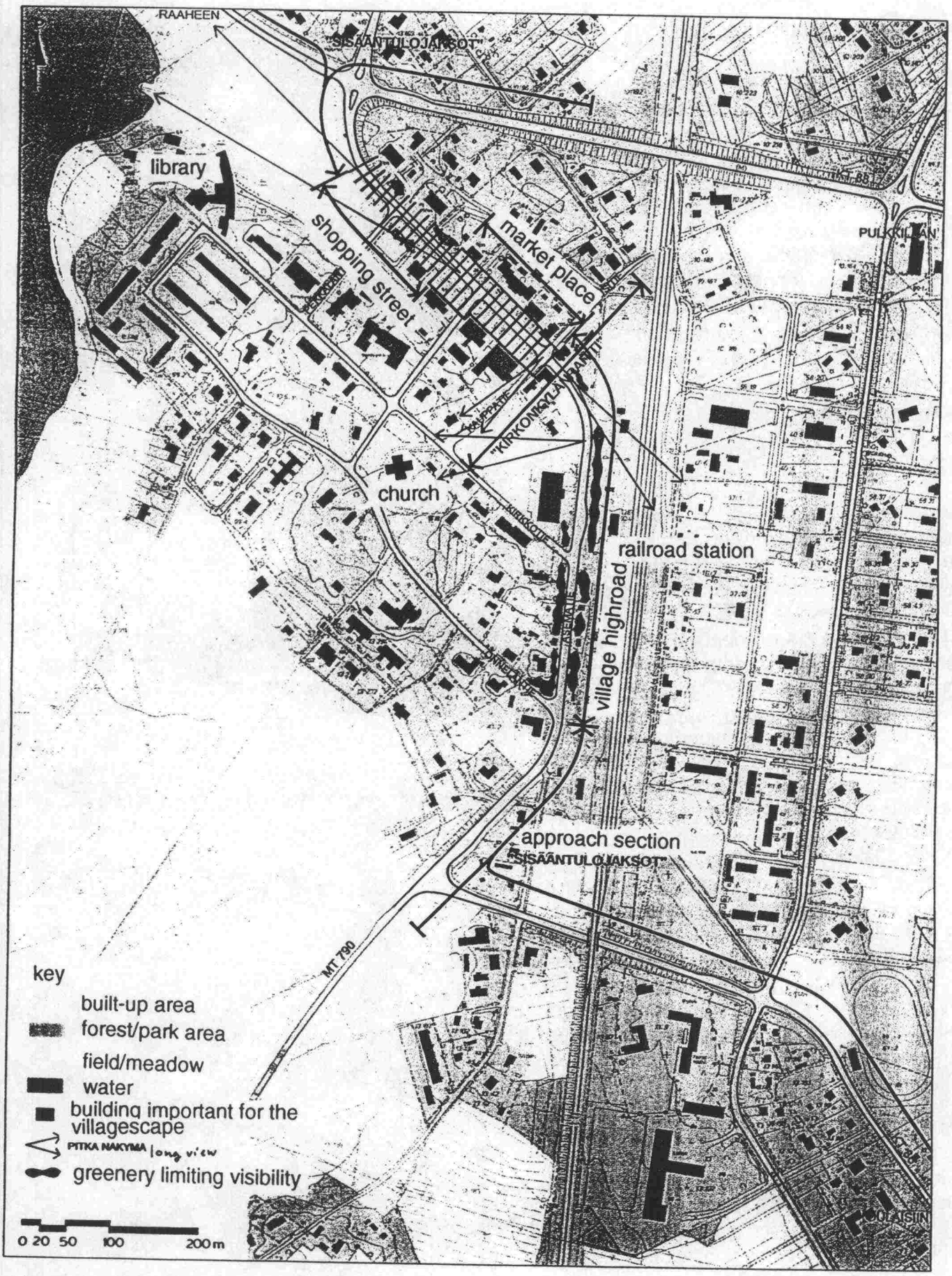
The built-up area has grown up as a highroad village along the road passing the church. Road construction and zoning have radically changed the structure of the area. The new approach road (Asematie) built in the 1960s has become the shopping street. The villagescape is a typical example of the results of road modifications in the 1960s: the traveled way and the parking areas in front of the stores form an unbroken paved area. However, the shopping street is clearly the focus of the area and, at least in summer, acts as a forum-like meeting place.

The old main highroad (Kauppatie, Susitie) is situated obliquely in relation to the present shopping street. There are three old wood buildings left at their intersection; all of these still house stores. These buildings form a pleasant gateway structure at the south end of the shopping street, while also constituting an older structural layer that enriches the villagescape.

Measures implemented in the 1980s have resulted in improvements: an architecturally interesting library has been built and the overgrown Lake Kirkkojärvi has been reinstated, so that the center now has a lake view.



6/97. Vihanti center 1:20,000, accidents in 1987-91 and road network construction phases.

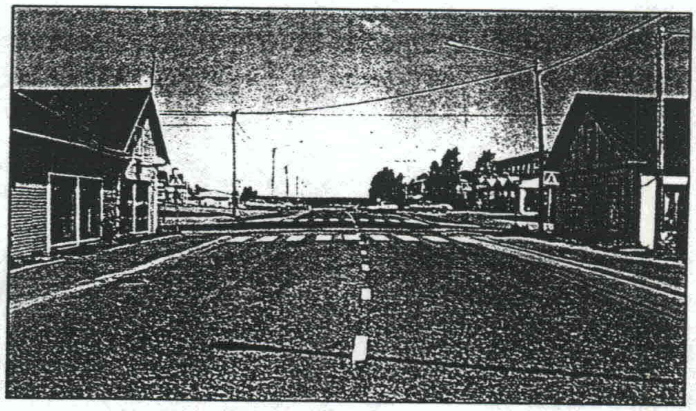


6/98. Vihanti throughroad segmentation.

Throughroad segmentation

The throughroad (Asematie) consists of the following clearly defined sections:

- Approach sections: from the north to the north side of the Pekkalantie intersection and from the south to the Onnelantie intersection
- Village highroad: from Onnelantie to Kauppatie, although this section is partly highway-like (from Kirkkotie to Kauppatie)
- Shopping street and market place: between Kauppatie and Pekkalantie

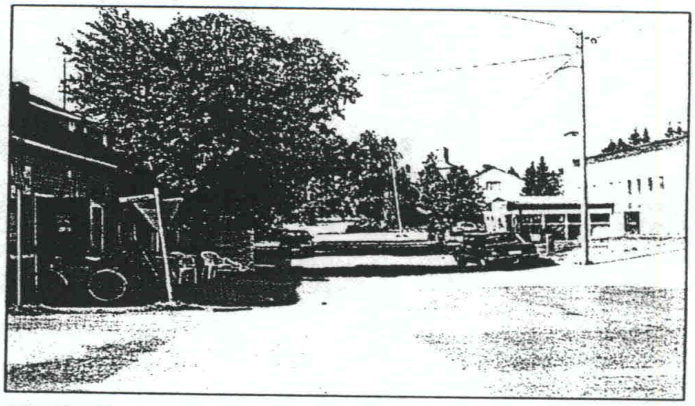


6/99. A gateway formed by old buildings before the market place in the center of Vihanti.

Development principles

Functions

A new market square will be placed on the present parking lot in front of the Osuuskauppa store, the functional focus of the area. This will provide a market square sufficient in size for a small built-up area and a natural everyday meeting place for the residents. The placement of the square along the central shopping street will support the businesses along the street. Conversely, the stores could support the market square - for instance, by opening up a café.



6/100. The old church village highroad of Vihanti.

The old buildings at the intersection of Asematie and Susitie, a contrasting gateway structure in the villagescape, will be preserved and renovated. Their present functions, particularly the restaurant, are well suited for these buildings, and they should ideally occupy them for as long as possible. The hardware store will probably at some point need more storage space, and could then be replaced by a large kiosk. Tearing down these buildings would unnecessarily reduce the diversity of the villagescape and impoverish the area's functions.

Even in a small BUA, the functional diversity of the center may suffer if new residents are not attracted to the area. For this reason, the empty plot between Susitie and the municipal offices is an excellent location for new housing - for example, two-storey apartment houses which can also house small stores or workshops on the ground level. Due to the central location, this

housing could well be service apartments, for example. The lawn between housing and the church would be preserved as a park and as a venue for special events. The view from Asematie toward the church will be retained.

There is probably no need for extensive business construction in the center of Vihanti in the near future, and in any case the necessary reserve plots for larger business buildings can be designated on the east side of Asematie.

Traffic arrangements

Market place

The traffic arrangements of the market place are designed with parking and crossing bike and pedestrian traffic in mind. The intersections at both ends will be elevated, creating humps that will

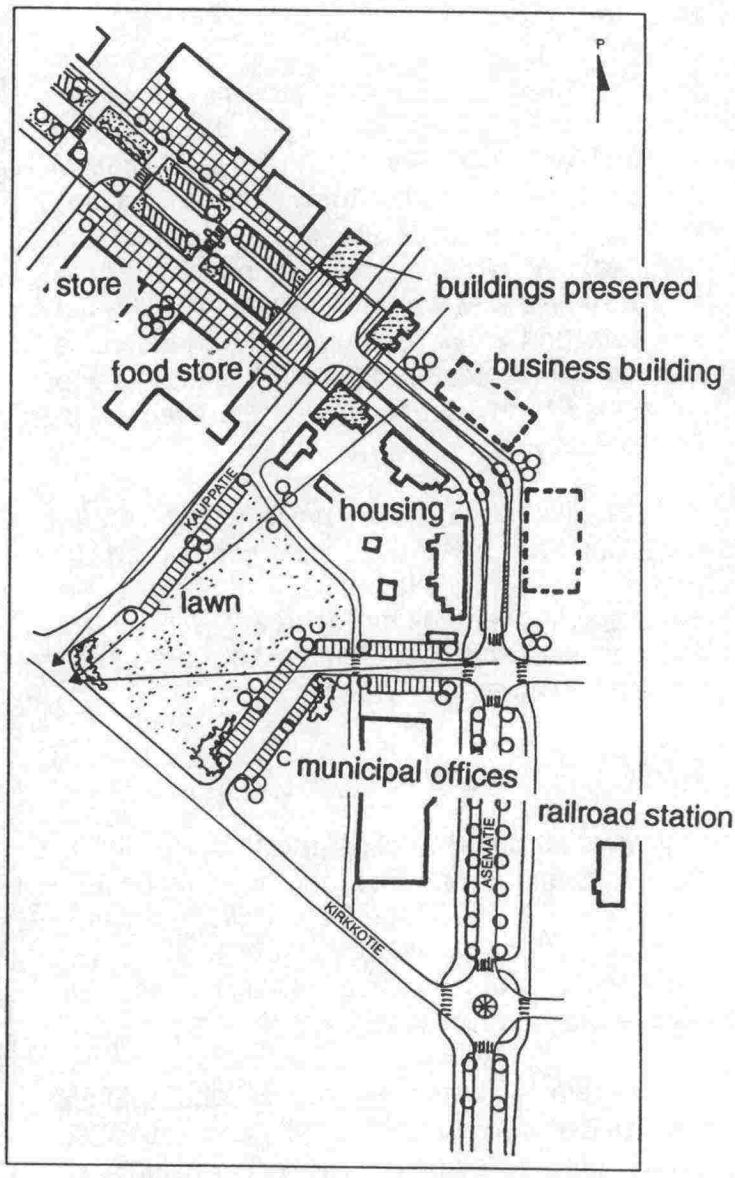
- reduce vehicle speeds from all approach directions
- link up closely with the market square
- make crossing the road easier
- make the intersection zones more compact, thus enabling preservation of the old buildings close to the Kauppatie intersection

A pedestrian crosswalk and island have been placed midway between the two intersections to facilitate crossing the market place on foot.

The new parking facilities include angled parking along the traveled way on both sides.

Highroad

Vehicle speeds on the southern approach will be constrained by building a mini-rotary intersection where Asematie and Kirkkotie meet. A sharp curve in the road, punctuated with trees, will also help reduce speed. The bus stops near the municipal offices will be built without bays. The bike and pedestrian traffic lanes are segregated from the traveled way by planting at the municipal offices and the railroad station. Between the municipal offices and the shopping streets, the bike and pedestrian traffic lanes are segregated from the traveled way by narrow paved strips, linking them with the elevated intersection on Kauppatie.



6/101. Design concept for the market place in Vihanti.

6.5.3 Ylistaro

Characteristics of the built-up area

Ylistaro is a rural municipality in southern Ostrobothnia, rich in tradition. The population of the main center was about 1,000 in 1992. The church village is located on a river, providing it with small-scale features differing from the surrounding broad flatlands, such as brooks running into the river. However, the trend in more recent construction has been away from the river.

On the opposite bank of the Kyrönjoki and outside the BUA proper is the great church of Ylistaro, a significant landmark visible from all over the area.

The built-up area itself consists of three subcenters connected by the central thoroughfare, Kaukolanraitti. The old historical center is along Kirkonkoski rapids, the old business center is at the center point of the highroad, and the newest subcenter - the administrative and commercial center - is at the southern end of Kaukolanraitti. Furthermore, a new small industrial and business area is being developed to the south, around the intersection with highway 64.

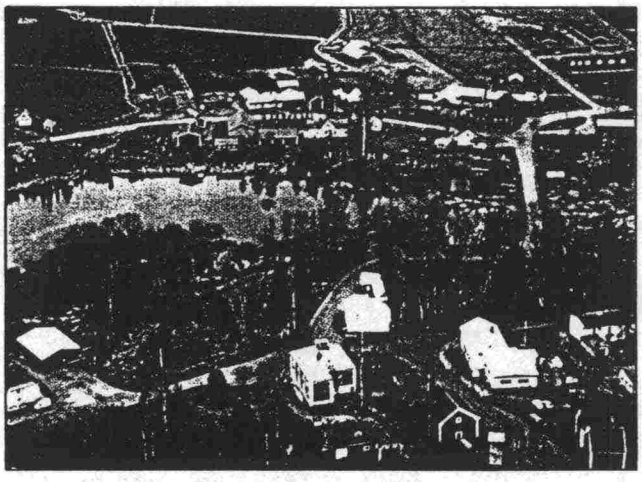
In 1991, FinnRA and the municipality of Ylistaro organized an invited design competition to develop Kaukolanraitti as an environment-oriented throughroad. The goals and design concepts presented here are based on the winning entry.

6/102. The center of Ylistaro 1:20,000 and accidents in 1987-91.

Traffic features

Highways 16 and 64 delimit the Ylistaro BUA to the north and west. The approach roads are Rapakuja and Yrittäjäntie from highway 64 and Kaukolanraitti and Kaskiontie from highway 16. The main thoroughfare, Kaukolanraitti, is classified as a minor road.

The maximum traffic volume is about 3800 vehicles per day. Between 1987 and 1991, the police were notified of eleven traffic accidents on Kaukolanraitti; five of these were PIF accidents,



6/103. The historical center of Ylistaro.

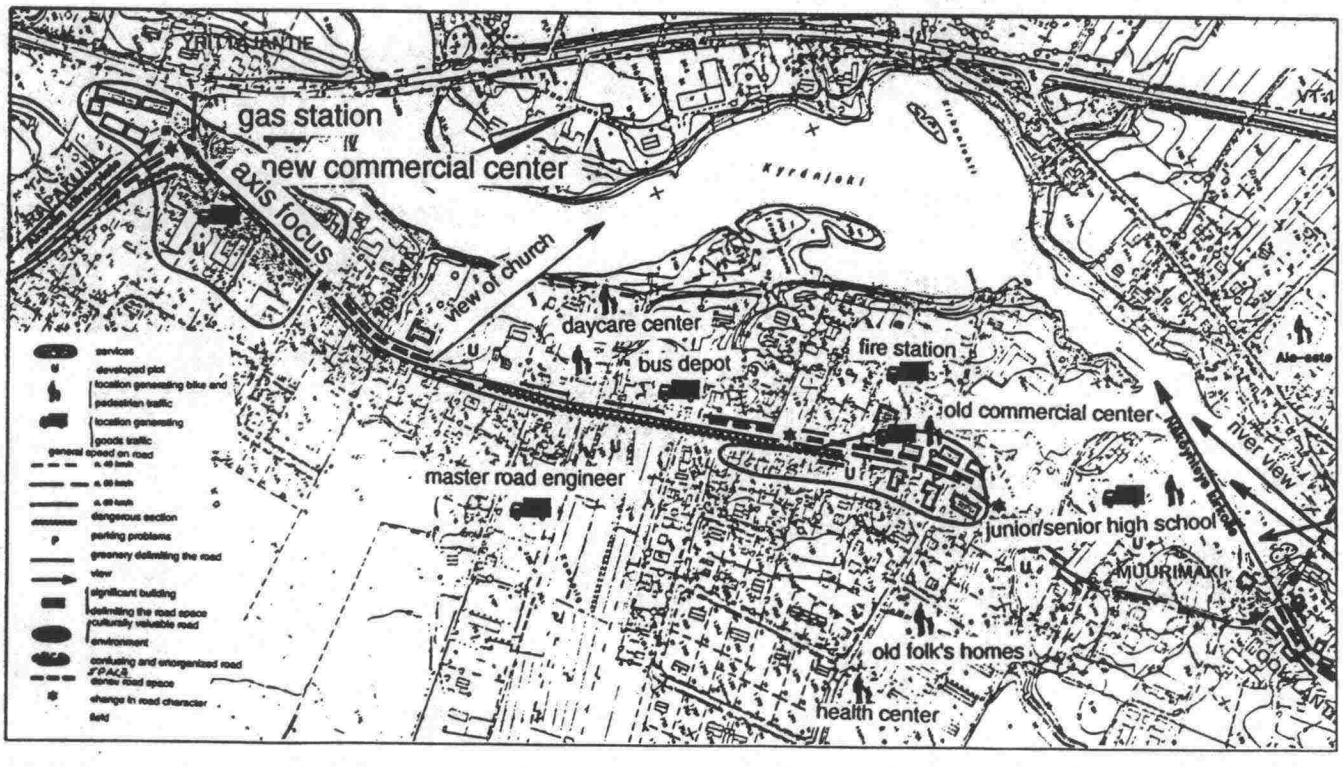
three involving a bicyclist. The other two were a rear-end collision and a turning accident. Three accidents occurred on Rapakuja, two of which were PIF accidents, both involving a bicylist. Apart from the lack of bike and pedestrian traffic safety, a major problem is the lack of proper parking facilities, the poor organization of existing parking and high vehicle speeds.

Throughroad segmentation

Approach roads:

Rapakuja in the south and Kaskiontie in the north are lined with housing. There are business buildings and halls for small industry along Yrittäjäntie. The approach roads have the following features:

- the buildings are pulled back from the roads
- Rapakuja is fairly straight
- Kaskiontie also resembles a highroad: the old granaries are adjacent to the road, and the buildings in the historical center still delimit the old market place; the road runs through a dignified environment, past the old dairy, the cemetery and a store building on the bank of the Kyrönjoki, across Kirkonkoski rapids and past an old mill on the opposite bank.
- traffic volumes are fairly low: the maximum figures for Rapakuja and Kaskiontie are 2000 and 900 vehicles per day, respectively
- the average vehicle speed on Rapakuja is 50 kph; 85% at 55 kph toward the center and 60 kph away from the center. Maximum speeds are 64 to 67 kph.



6/104. Throughroad segmentation, based on the winning entry in the Ylistaro design competition.

6/105. The administrative and commercial center of Ylistaro. Highway 16 runs to the left of the river. Kaukolanraitti is in the middle.

Church village highroad:

- after the Ookilantie intersection, the spacious northern end of Kaukolanraitti passes over Muurimäki hill and past the school complex to the old business center
- average vehicle speeds are 47 to 48 kph; 85% drive at 52-55 kph. The maximum speeds are 67 kph toward the center and 80 kph away from the center.
- the section of Kaukolanraitti between the old and the new business centers contains individual features like a row of fir trees to the south of the old stores, the Matkahuolto bus depot, the municipal engineering department building, with trees and a view of the church over the river, and the crossing of 'Tonava', i.e. a brook running into the Kyrönjoki river.
- the maximum traffic volume is 3800 vehicles per day
- the average vehicle speed at the brook crossing is 47-48 kph; the 85% speed is 53-54 kph, and maximum speeds are 63-65 kph

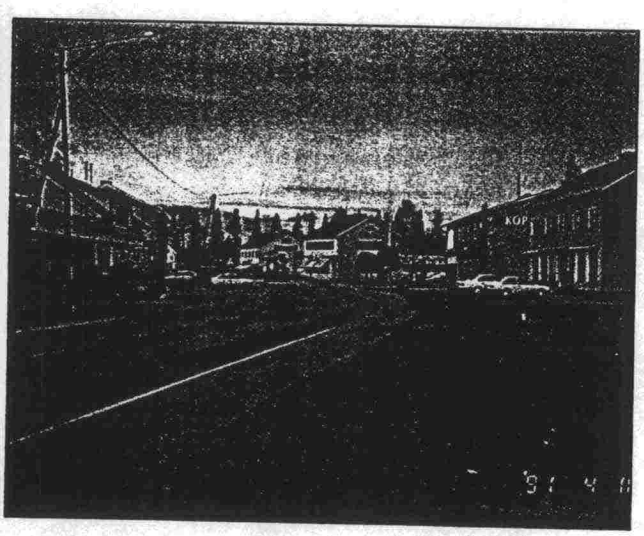
Market place:

- the old business center, with diverse but closely spaced buildings
- parking in front of the stores, on a uniform paved area
- the average speed to the south of the market place is 49 kph; the 85% speed is

56 kph, and maximum speeds are 73-75 kph

Shopping street:

- southern part of Kaukolanraitti
- the government office building is a dominant environmental element at the end point of Kaukolanraitti
- the business buildings are distant from the road, and segregated from it by parking places; the spatial character of the area is nondescript
- there is a lot of traffic across the road and market stalls on the supermarket parking lot on certain days



6/106. The old commercial center of Ylistaro.

Design goals

The essential characteristics of the various parts of the built-up area must be enhanced, while avoiding an unduly urban overall appearance. The street furniture and other features of the road environment are subordinate to the whole. Urban features may be used only in the present commercial center.

Approach roads:

- vehicle speeds should be reduced to 40 kph right at the entrance to the area
- construction of the new approach road from the north will bypass the beginning of the present Kaskiontie, but the twisting alignment is a fine speed constraint as it is
- it is important to preserve and underline the rural atmosphere along the approach roads

Church village highroad:

- the nature of the highroad should be clearly visible in the road design and its relationship to the environment; the present characteristics of the highroad must be preserved, particularly the flora
- vehicle speeds must be lowered through structural means and zoning and environmental design

Market place:

- the market place will be kept rural, i.e. the road will run between the buildings and parking spaces will be placed along the road
- new surface materials must be used very sparingly and with great discretion

Shopping street:

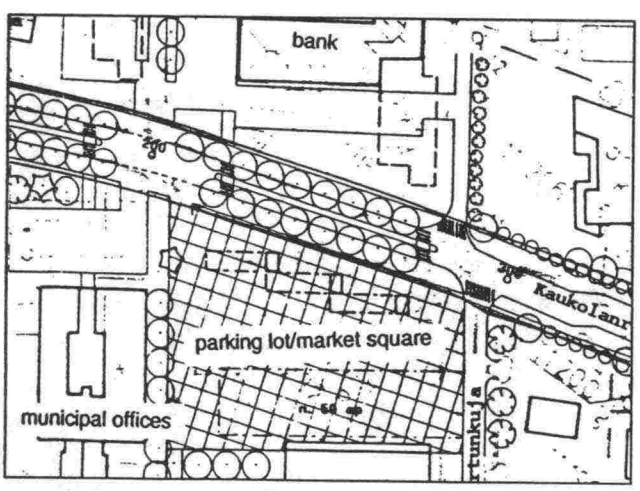
- this section of Kaukolanraitti requires more work; the spatial organization must be improved with planting and complementary construction
- the parking facilities must be more clearly organized
- the road must be integrated into its environment

Design concepts

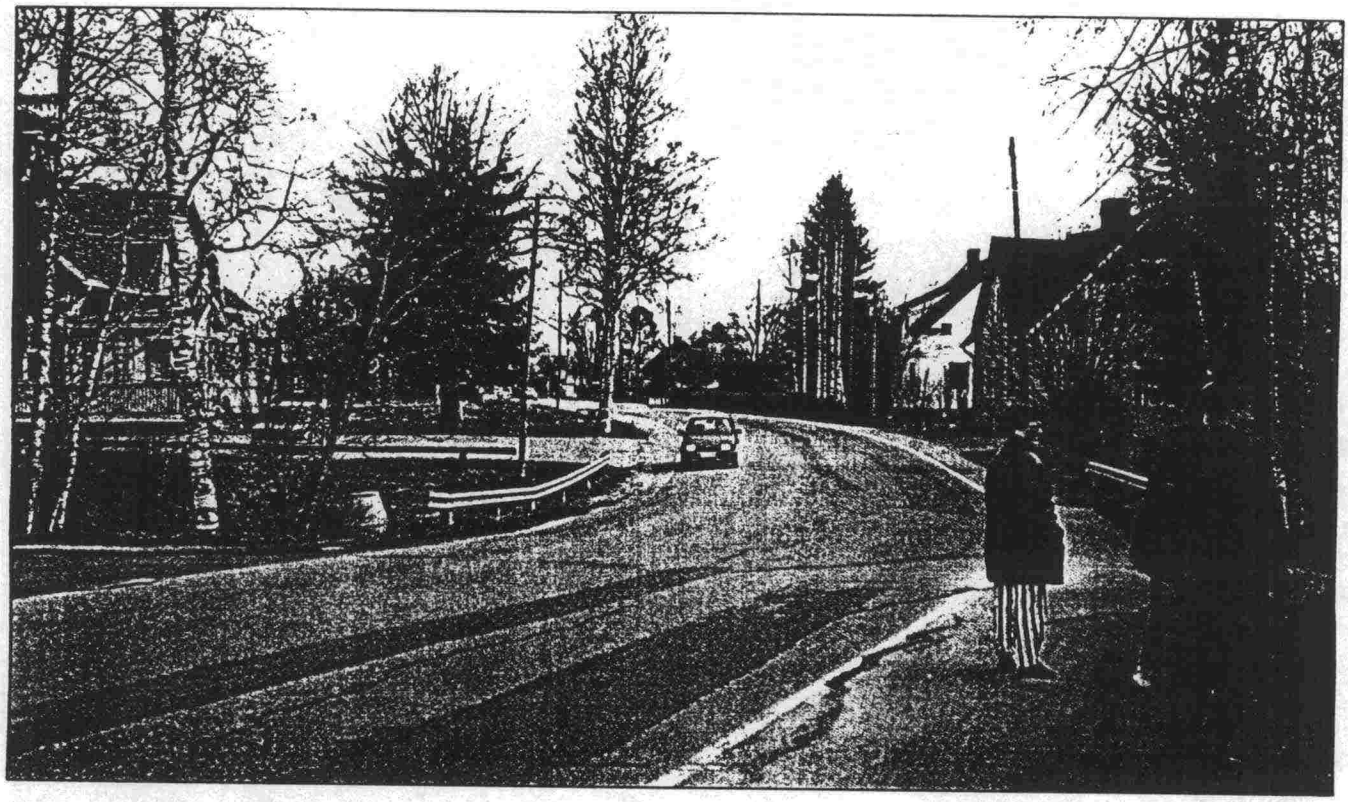
To reduce vehicle speeds, increase safety and improve the environment, the following measures are proposed:

- impose a speed limit of 40 kph
- change the character of Rapakuja (an approach road) from an open road into a closely built-up downtown road by degrees, by condensing the geometry and profile of the road
- the administrative and commercial center is urban in character. Kaukolanraitti will be segregated from bike and pedestrian traffic routes with rows of trees; parking facilities will also be placed on plots, away from the road. The lighting fixtures will emphasize the focus of the area.
- the cross-section of Kaukolanraitti will be narrowed to 6 m. Any extra width required at intersections will be paved with cobblestones to preserve the visual effect of a narrow traveled way
- the section of highroad between the two commercial centers will meander, preserving the trees and hedges lining the road
- speed constraints used will include central islands, rumble strips, and a rotary intersection at the approach to the commercial center
- new buildings will delimit the road space at places where it is now open, emphasizing important nodes in the structure (e.g. placing the new Matkahuolto bus depot opposite the government office buildings to form a gateway toward highway 16)
- the vertical alignment of the road will be made to match the adjoining plots. A cobblestone arched bridge will be built over the brook and Myllyoja, which will be dammed, to act as a speed constraint and to harmonize with the spirit of the church village highroad
- bike and pedestrian traffic paths will run on either side of Kaukolanraitti, at places separate from the traveled way, for instance when circling existing groups of trees
- granite paving stones will be used

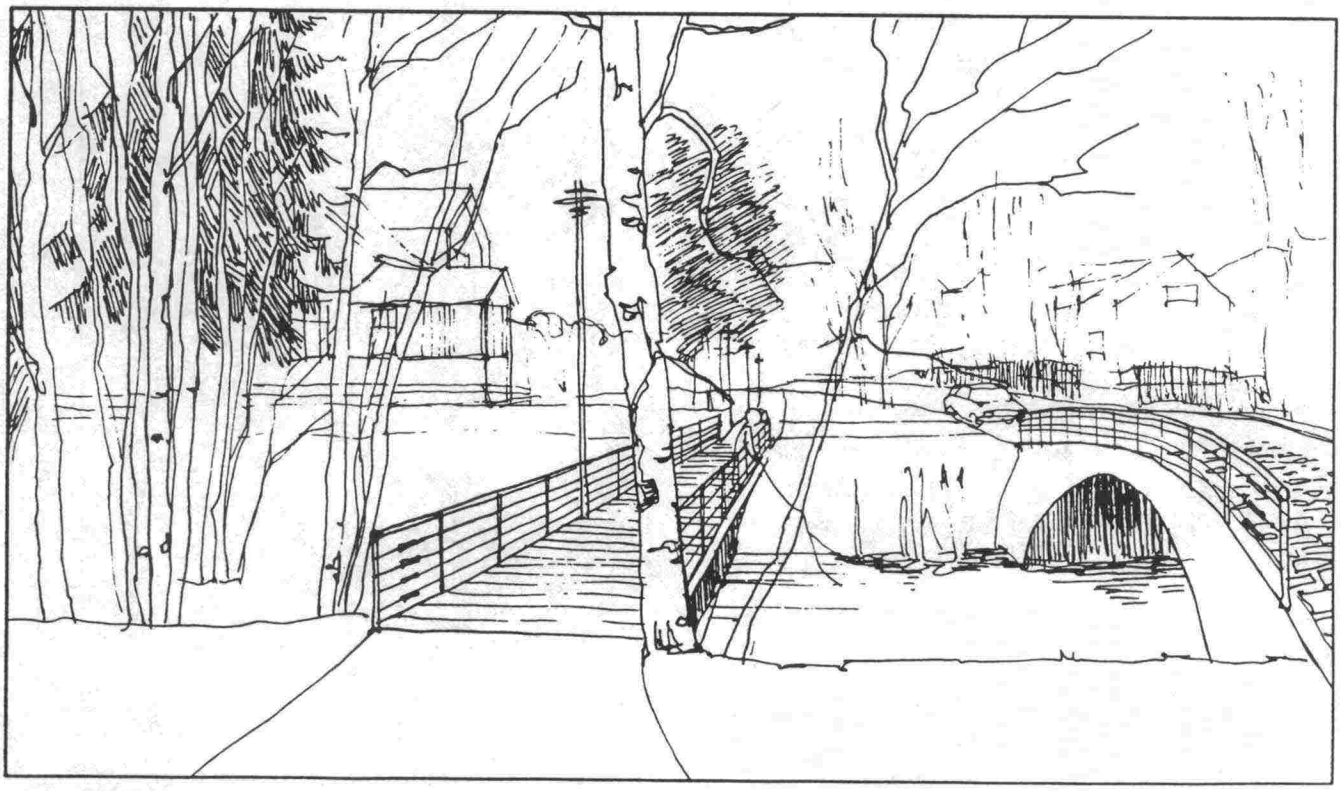
After the competition, a general scheme was drawn up for the roads in Ylistaro center. The design concepts are more clearly set out in this scheme. The road arrangements differ slightly from the competition entry (for instance, the traveled way width is 6.5 m), but in the main the plan is the same.



6/107. Design proposal for the market square.



6/108. The brook crossing today.



6/109. The bridges across the brook in the winning entry.

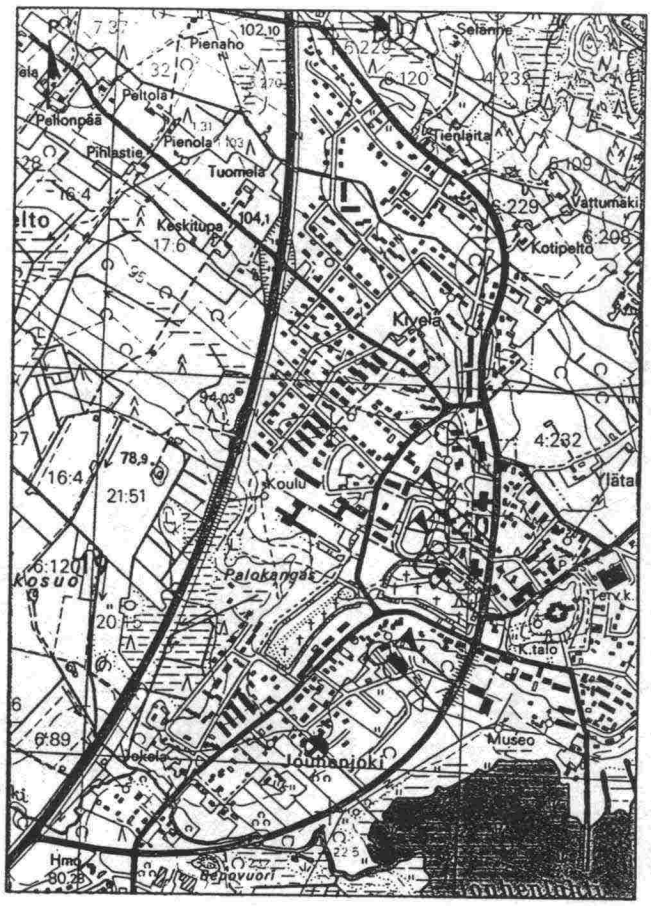
6.5.4 Kerimäki

Characteristics of the built-up area

The church village of Kerimäki is located on the western shore of Lake Puruvesi in the Saimaa water system, about 25 km east of Savonlinna. The population of the main center is about 2,700.

Kerimäki is an example of a built-up area whose structure and environment have been substantially altered by road network design and zoning measures in the 1960s.

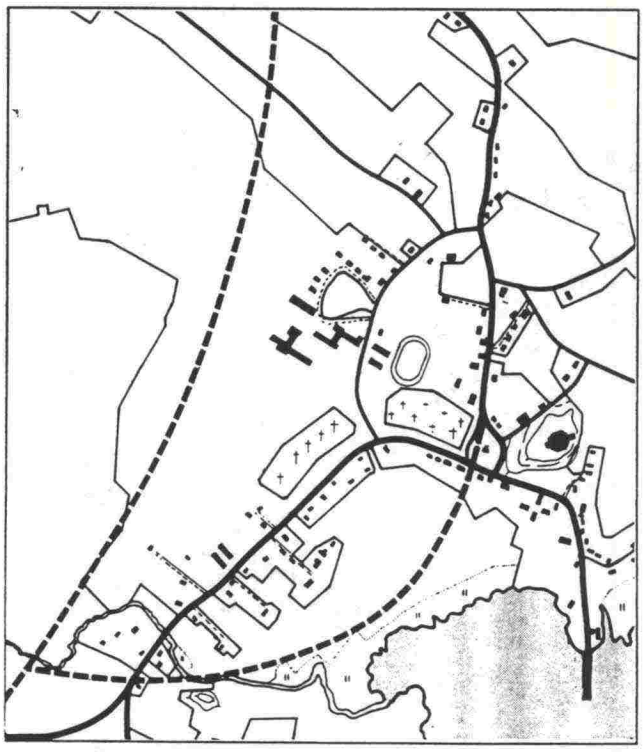
A bypass has been constructed (highway 71), and a new approach road completely isolated from land use has been provided from the south. This approach road meets the old shopping street (Puruvedentie) at right angles in the center of the village, right below the famous wooden church. The approach road continues through the center and rejoins highway 71 to the north of the area. The thoroughfare is very highway-like, wide and geometrically smooth. There is a plan for channeling intersections in the village center.



6/110. Kerimäki church village in the late 1980s (1:20,000) and accidents in 1987-91.

The business center is still mainly located in its old place, at the foot of the church hill, but there is a tendency for it to spread out along the approach road to the south. Here, the road has been placed in rural fashion on an embankment running up the hillside. The bus depot and market square, with an adjoining business building, were built on the east side of the road in the early 1980s, and a supermarket on the west side in the late 1980s. These two are linked by a bike and pedestrian traffic tunnel under the approach road, which runs along a high embankment in the middle of the emerging business center. The result is an ugly and unpleasant new village center, particularly in comparison with the still dynamic old village center.

The development of Kerimäki is a case in point of what happens when throughroad design takes no account of the properties and development potential of the environment. Despite its low traffic volumes, the thoroughfare was designed as a highway.



6/111. Kerimäki church village in the mid-1960s. The proposed new bypass and throughroad are shown by dotted lines.

In order to develop the center of Kerimäki, the intersections of the thoroughfare should certainly not be widened. Rather, the thoroughfare should be reconsidered: what should its character be, how can vehicle speed be constrained, and how can the appearance and appeal of the new business center be improved?

Traffic features

The Kerimäki throughroad (local road 15371) is classified a minor road in the national road network. In the area road network it is a thoroughfare, joining highway 71 at both ends. The traffic volume on the throughroad is fairly low, about 2,300-2,900 vehicles per day. No long-distance through traffic uses the throughroad, although there is a lot of tourist traffic in the summer due to the famous church.

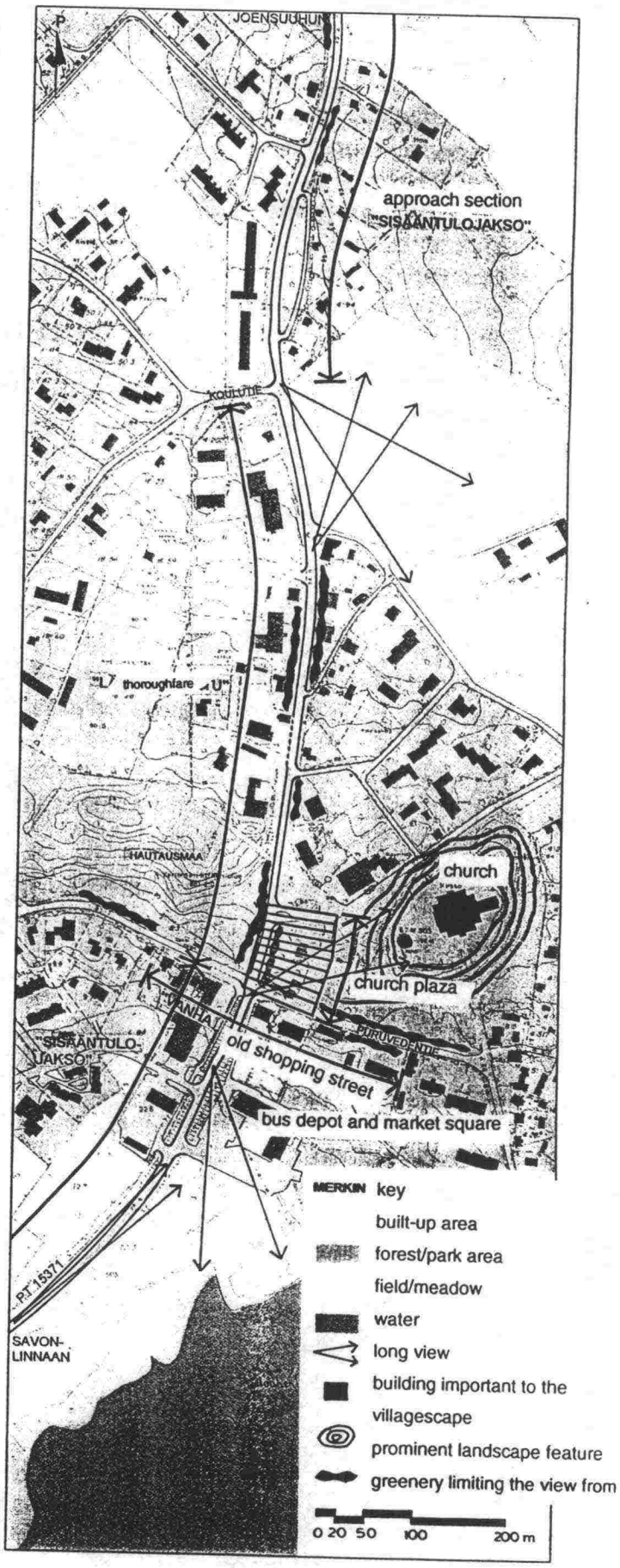
Between 1987 and 1991, the police were notified of fourteen accidents, nine of which were PIF accidents. Five of these involved bike and pedestrian traffic.

Throughroad segmentation

Southern approach section

This section was built at the same time as the bypass (highway 71). It begins at the highway and ends at the old shopping street (Puruvedentie) in the village center. Typical features of this section are:

- the road is distinct from the built-up environment
- the new business buildings are also pulled back from the road
- the road is wide, geometrically very smooth and rural in appearance
- there is very little bike and pedestrian traffic (the old route is preferred)
- two PIF vehicle accidents and one bike and pedestrian traffic PIF accident occurred on the section
- the road invites high vehicle speeds



6/112. Throughroad segmentation in Kerimäki.

Northern approach section

The section begins at the highway and ends at the Koulutie intersection near the village center. Typical features of this section are:

- there is housing to the west of the road, but it is pulled back
- the east side of the road is mainly unbuilt, partly fields
- the road is geometrically on a smaller scale than the southern approach section
- there is some bike and pedestrian traffic along the road at the southern end of the section
- two single vehicle accidents occurred at the north end of the section

Thoroughfare

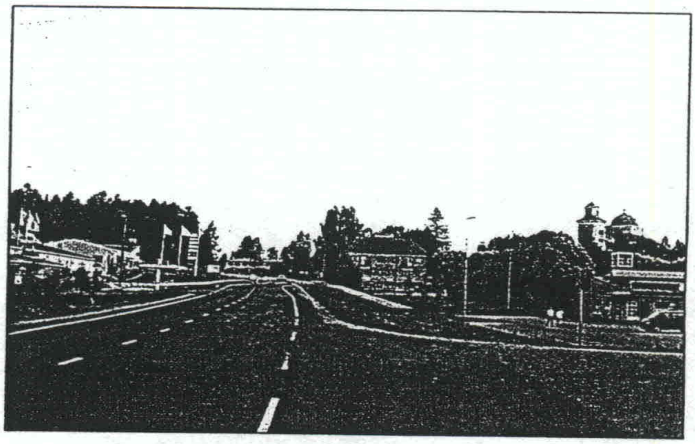
The section between the two approach sections at the center of the village is a thoroughfare. The new business center lies to the south of it, while the services built in the 1960s and '70s are on its east side. The old shopping street crosses the section at its southern end. Typical features of this section are:

- the buildings are pulled back from the road.
- the road is wide (9 m) and favors motor traffic
- this section has the greatest traffic volume, but there are no functional problems
- there is a lot of bike and pedestrian traffic across the road (schools, stores, cafés, the church)
- this section has the greatest number of bike and pedestrian traffic PIF accidents (two involving bicylists and one involving pedestrians)
- there has been one PIF accident at the main intersections

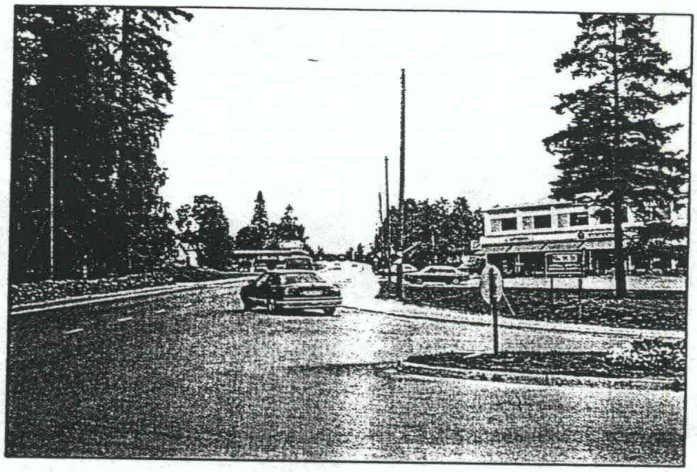
Design goals

Southern approach section:

- the road will be made less rural and more highroad-like to make the approach to the built-up area easier to visualize



6/113. Southern approach section.



6/114. The thoroughfare in the center.

- vehicle speeds will be reduced at the intersection serving the bus depot and the new business center
- the status and safety of bike and pedestrian traffic will be improved with a new bike and pedestrian traffic path

Northern approach section:

- vehicle speeds will be kept down with a narrower cross-section
- vehicle speeds will be constrained where the approach section becomes the shopping street section
- the status and safety of bike and pedestrian traffic will be improved with a new bike and pedestrian traffic path
- improved pedestrian crosswalks will be provided at key points (e.g. school routes)

From thoroughfare to shopping street:

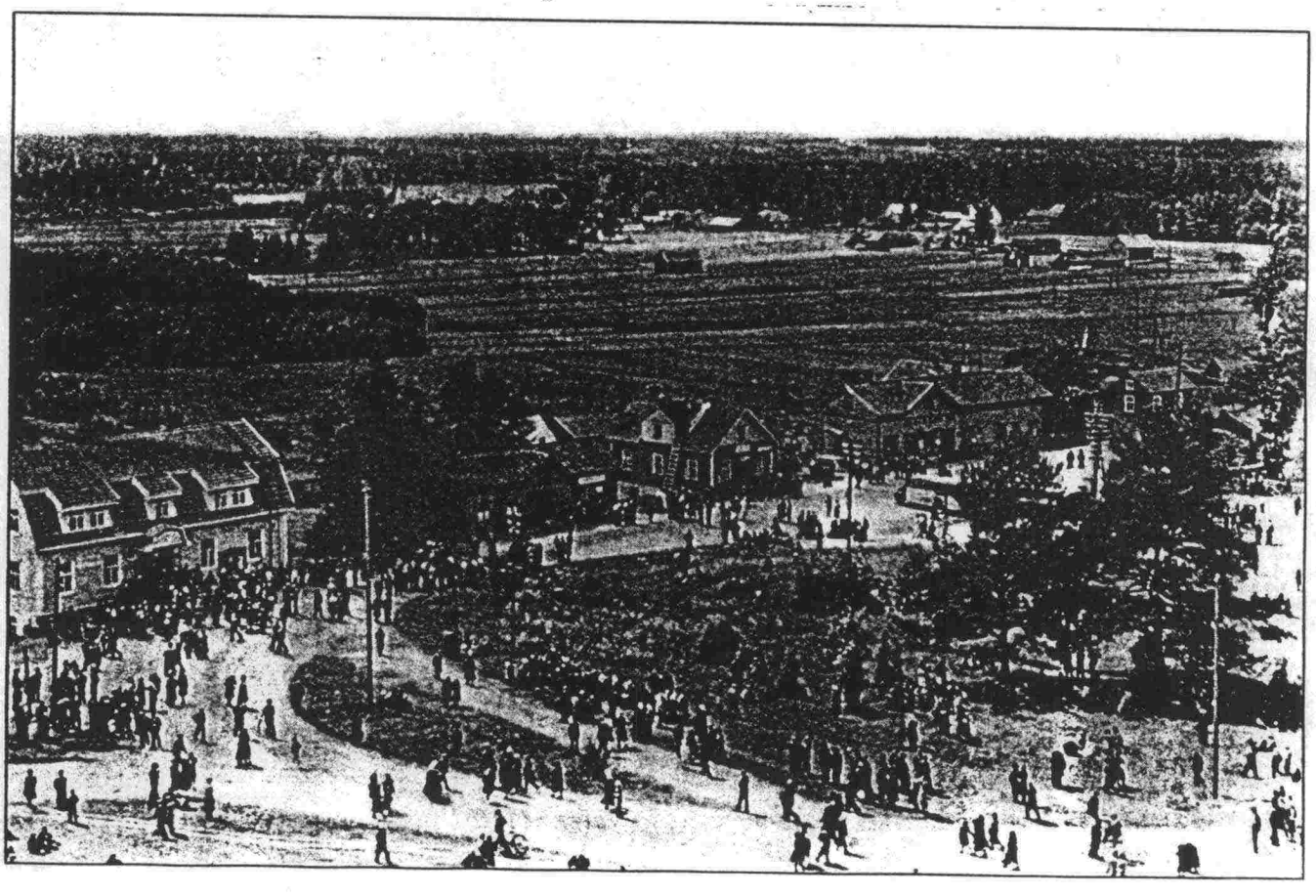
- the character of the road will be shifted from thoroughfare to shopping street by integrating the road more closely into the surrounding functions
- the thoroughfare will favor motor traffic less
- the safety of bike and pedestrian traffic will be improved by constraining vehicle speeds and making road crossing easier
- the status of the church in the villagescape will be enhanced

6/115. Kerimäki church plaza and the old shopping street. Photo taken from the church belfry in the late 1940s (cf. design B).

Design concepts

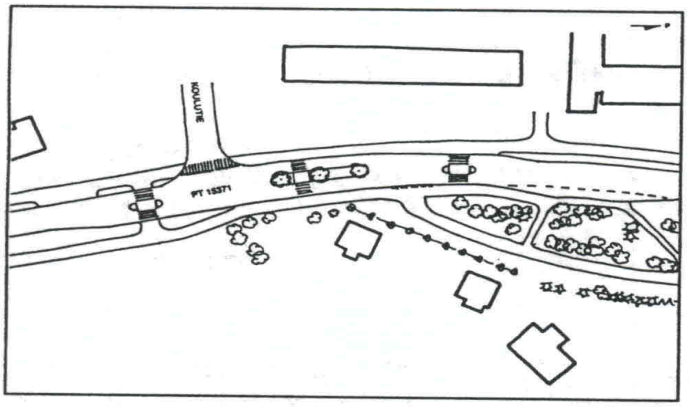
A rotary intersection is being designed for the intersection of the bus depot and the southern approach section, to reduce vehicle speeds at the entrance to the shopping street. The intersection with Puruvedentie will be provided with islands to constrain vehicle speeds and make road crossing easier. The bus stop at the north end of the cemetery can be converted into a traffic constraint by omitting the bay and constructing a long central island next to the stop. This will also protect the bike and pedestrian traffic crossing the road at the bus stop (design A, Fig. 6/119).

In design B (Fig. 6/120), the role of the church as the most important landmark in the built-up area and as an important sight for tourists has been enhanced by moving the throughroad to the traditional approach route. This design restores the extensive park in front of the church, which was removed when the present road network was constructed (cf. the road network in the 1940s, Fig. 6/115). This design emphasizes the role of the village center as the end point of a trip and reinstates the church as

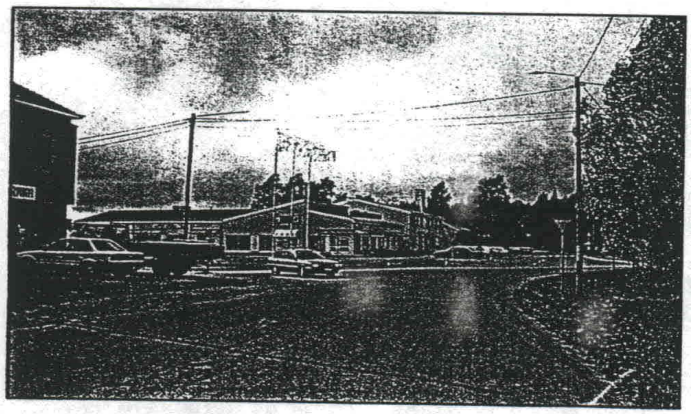


the main landmark of a unique church village. At the same time, this design is conducive to lower vehicle speeds in the vicinity of the church.

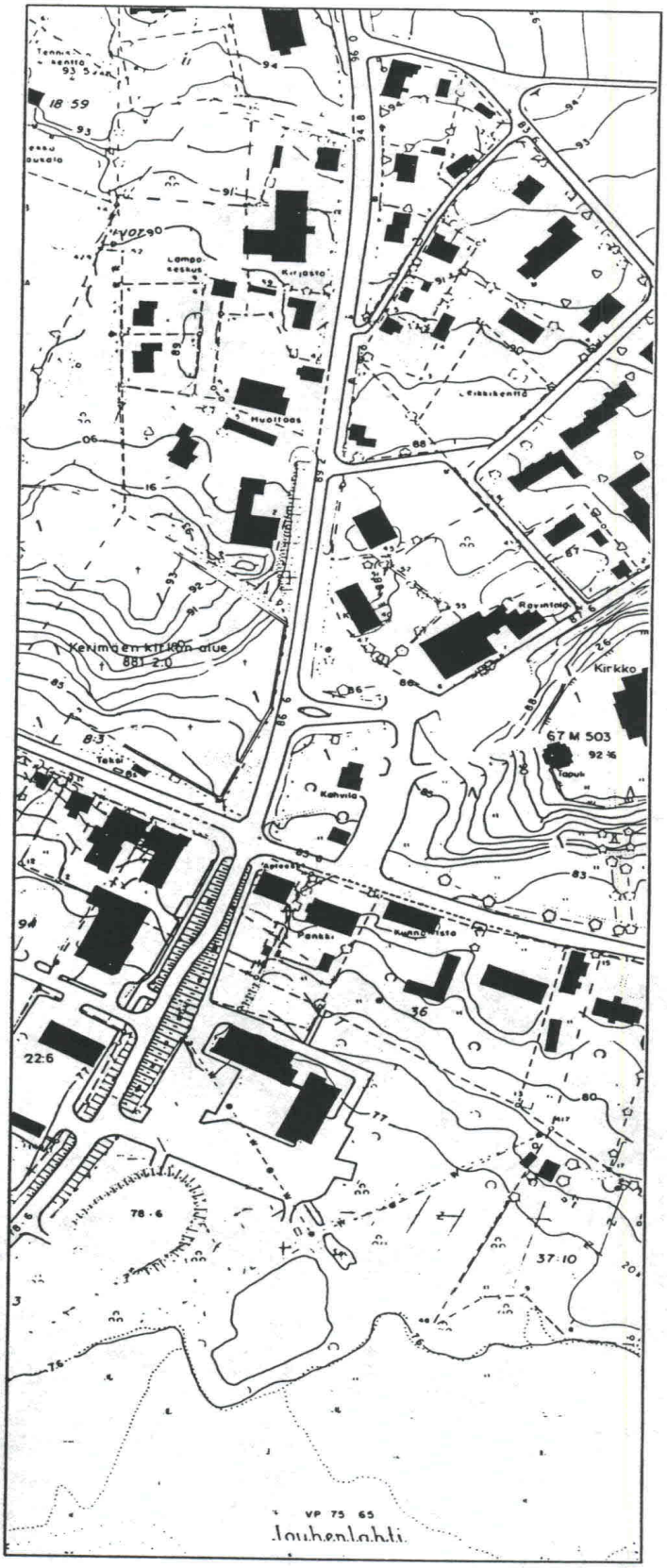
A constraint is planned as a gateway between the northern approach section and the shopping street section at the Koulutie intersection. This would also facilitate road crossing at the bus stops. The constraint consists of three islands (Fig. 6/116). The islands placed before the bus stops alter the driving path, reduce vehicle speeds, and make road crossing easier. The long central island with planting between the bus stops acts as a gateway and reduces vehicle speeds.



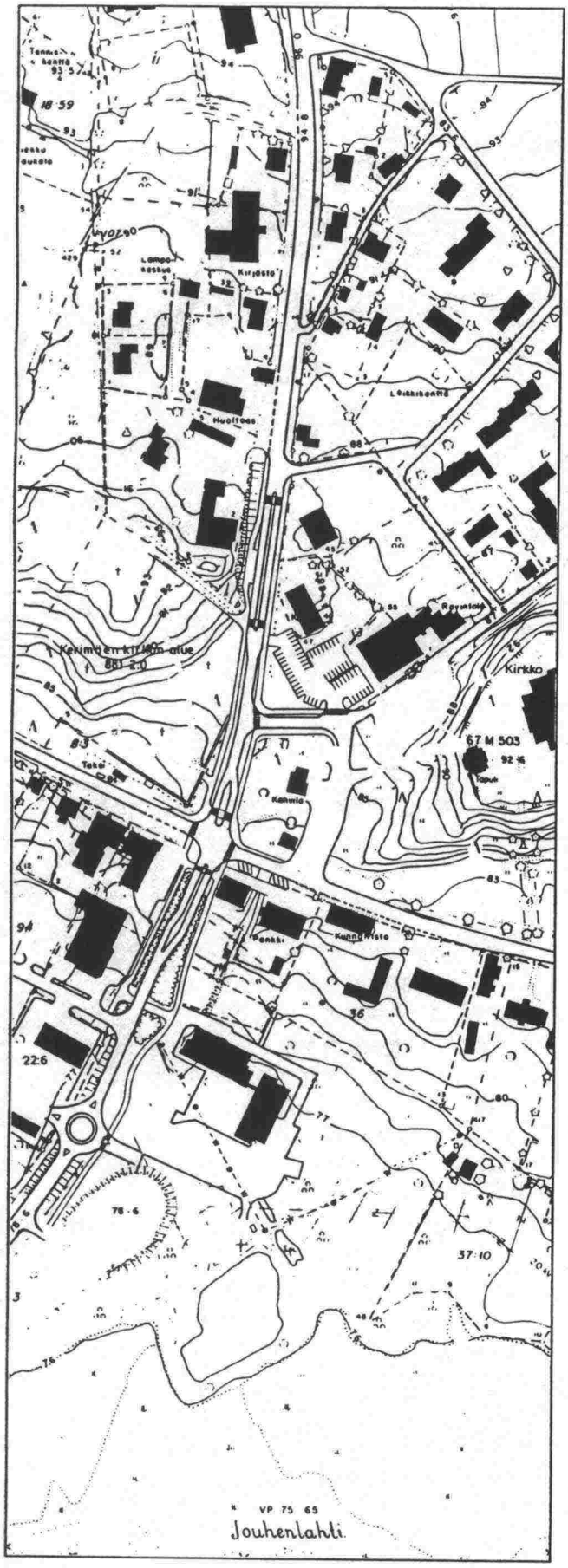
6/116. A constraint acting as a gateway between the northern approach section and the shopping street.



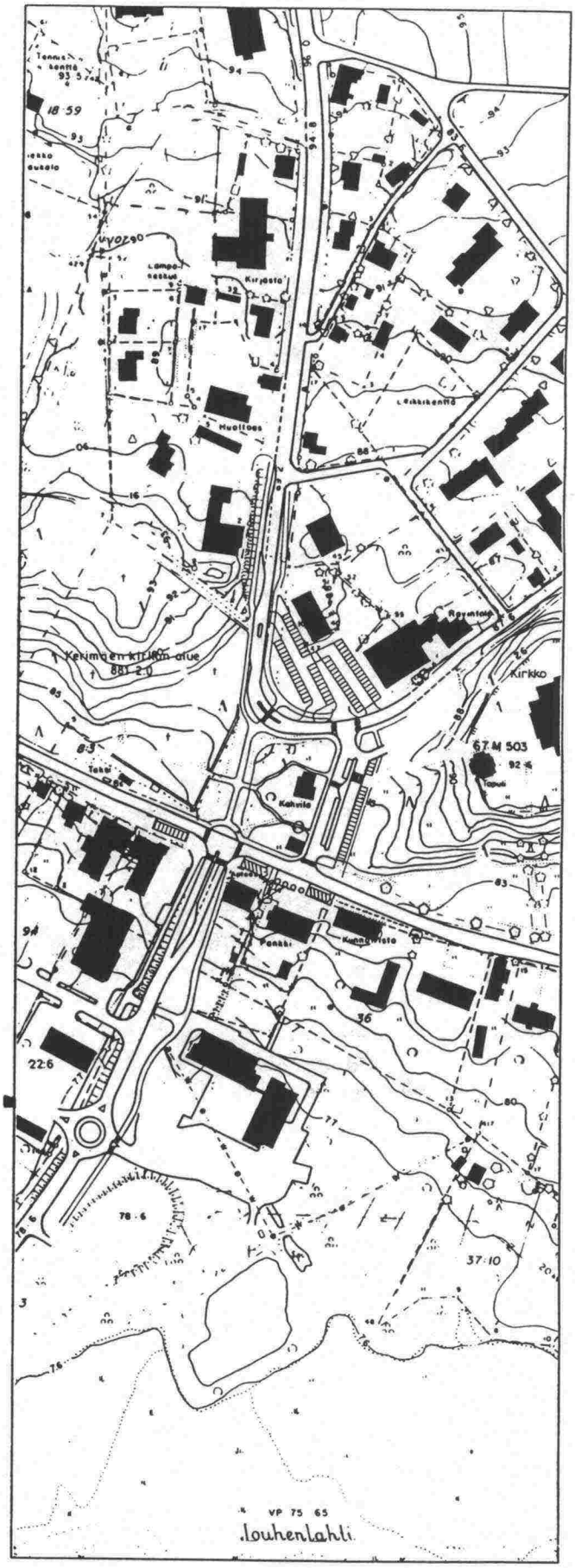
6/117. The environment of Kerimäki's old shopping street has changed.



6/118. Present situation.



6/119. Design A: moderates motor traffic and improves the status of bike and pedestrian traffic.



6/120. Design B: also emphasizes the importance of the church.

6.5.5 Rantasalmi

Characteristics of the built-up area

Rantasalmi church village is a typical rural built-up area in terms of size, structure, and environmental features. The population of the village was about 2000 in 1992. The church village is a highroad village, located along a 2 km strip on the eastern slope of Ruutanaharju ridge on the shore of Lake Heinävesi.

The highroad has views of both the pine-forested ridge and the lake, thanks to clearing of the shore area. The building stock has been considerably renewed, particularly in the 1980s. The clearly delimited street space of the highroad has gradually expanded, with new buildings being pulled farther back from the road than their predecessors.

All the major functions of the area are located along or close to the highroad. The shopping functions are concentrated in a fairly limited area. The church is located on top of the ridge.

6/121. Rantasalmi church village 1:20,000 and accidents in 1987-91.

Traffic features

In the national road network, the Rantasalmi throughroad is a minor road which joins the roads bypassing the built-up area at both ends. In the area road network it is the service center thoroughfare. The traffic along the road is exclusively internal or local.

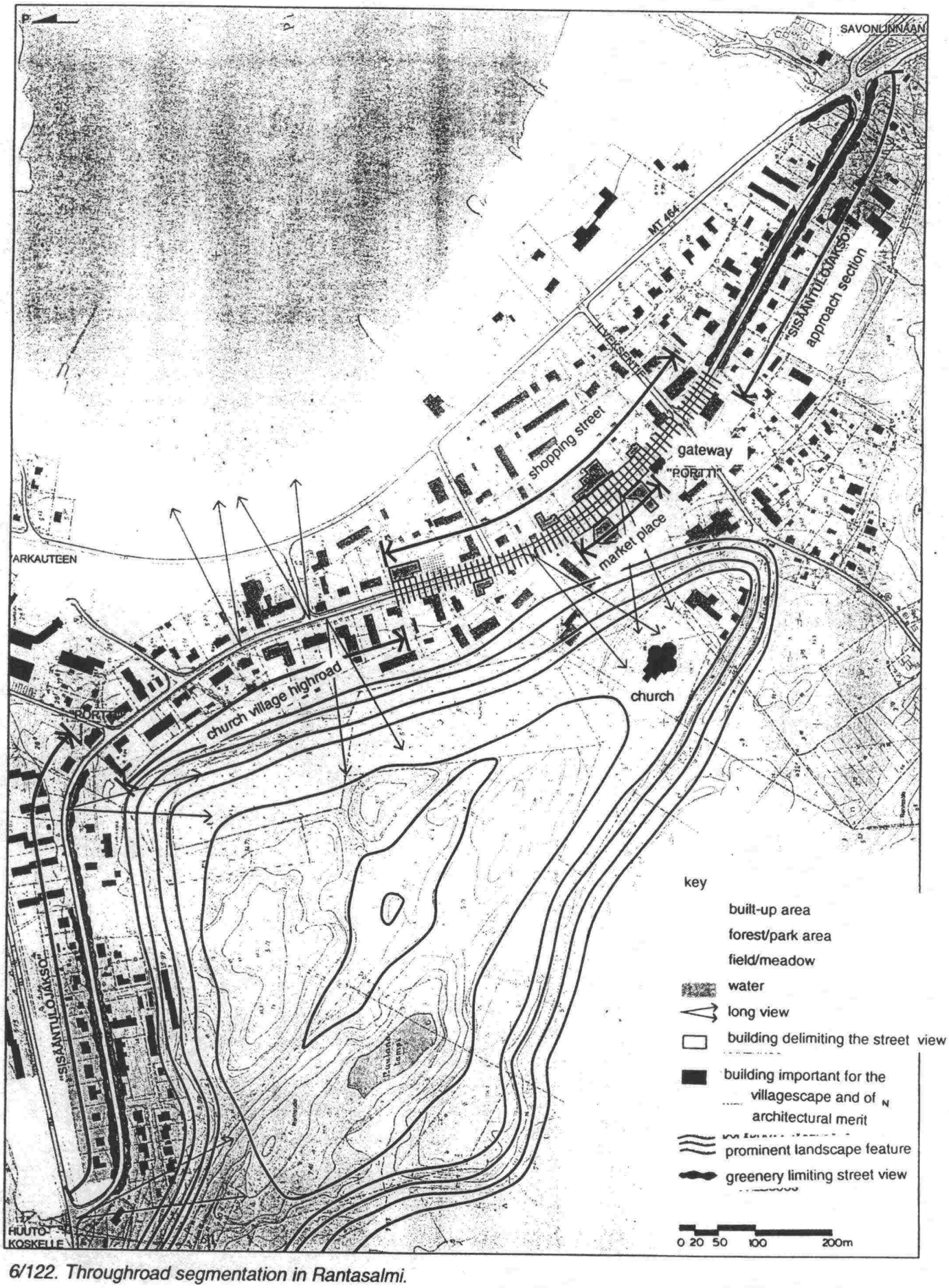
The main traffic problem is the poor bike and pedestrian traffic safety, there being no sidewalks or bike and pedestrian traffic routes. Between 1987 and 1991, the police were notified of ten traffic accidents. Six of these were PIF accidents, five involving bike or pedestrian traffic.

Segmentation

Approach sections

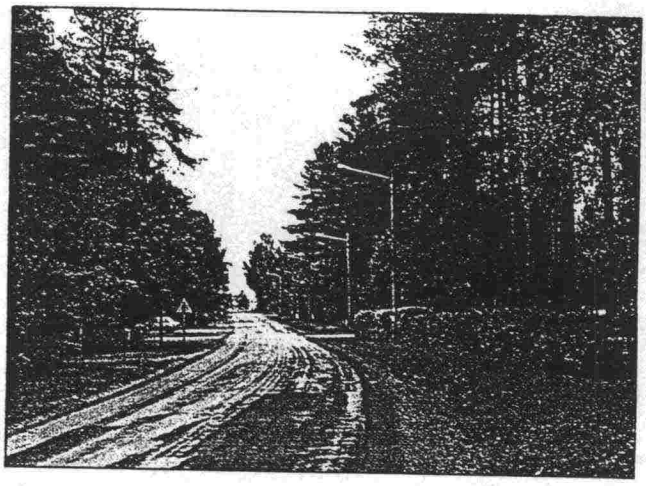
The approach sections at either end of the road are fairly similar, sharing the following features:

- buildings are pulled back from the road
- the road is delimited by trees and hedges lining plots (there are plenty of beautiful original pine tree groups on the ridge at the north end of the road; their tops form an impressive street space); the road is straight and highway-like
- most of the traffic is heading to the center from outside the section
- the traffic volume is about 800 vehicles per day at the north end and 1800 vehicles per day at the south end
- the average vehicle speed is about 50 kph; the 85% speed is about 55 kph, and the maximum speed is over 80 kph
- bike and pedestrian traffic volumes are low, and most of this traffic moves along the road
- only one property-damage bike and pedestrian traffic accident has occurred in the approach sections.



6/122. Throughroad segmentation in Rantasalmi.

The northern approach section terminates in a clear gateway formed by two old buildings that are important for the villagescape (the old municipal offices and Rissanen's store). Unfortunately, the road has been elevated, undermining the visual status of the old municipal office building, which is marked for demolition in the building plan pending approval.

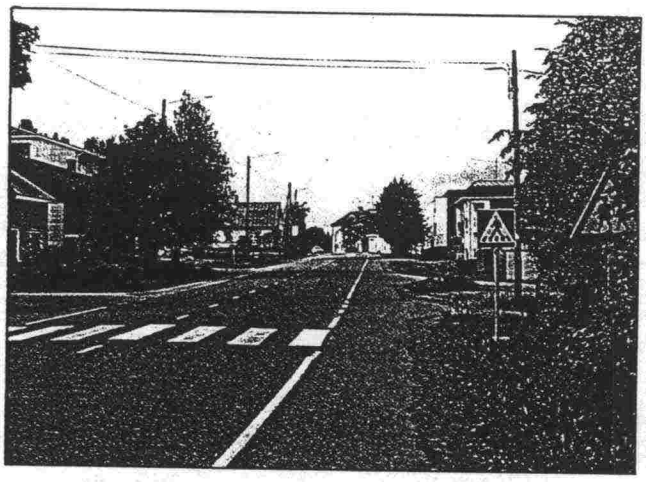


6/123. The northern approach section.

Church village highroad

The gateway opens into the church village highroad section, which is delimited alternately by trees, hedges and buildings. There are some stores with parking spaces in front, and in places housing plots stand right on the road. The environment is spacious and rural.

The traffic volume in the highroad section is some 1000 vehicles per day higher than elsewhere, due to traffic from side roads. Some of the traffic stops at services along the highroad. The average speed is about 45 kph, but maximum speeds are still about 70 kph.

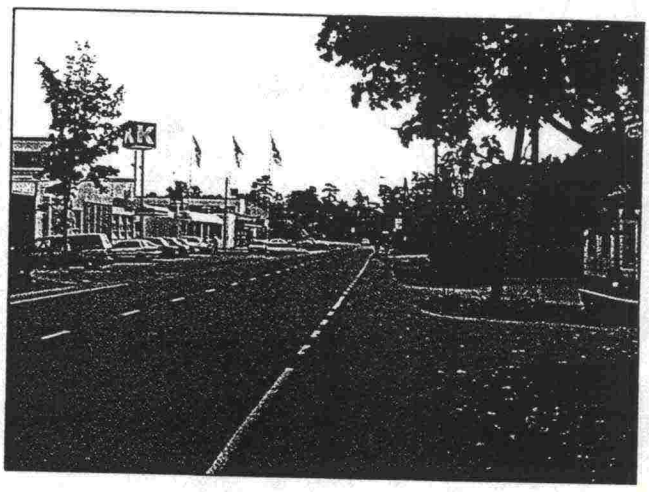


6/124. The church village highroad section.

The bike and pedestrian traffic volumes are considerably higher than on the approach sections, mainly because of school traffic. Road crossing is also much more common because of the services placed along the road. This section has had one PIF bike and pedestrian traffic accident.

Shopping street and market place

Approaching from the south, the approach section turns into the shopping street just before Ilveksentie. The old health center and SYP bank building form a clearly defined gateway. After the gateway, the highroad broadens into a market place on which stand the Osuuskauppa store, the bus depot and a business building constructed by Osuuspankki bank in the 1980s. This place is clearly the busiest point on the shopping street and its functional focus. Approaching from the north, the church village highroad turns into the shopping street at the municipal offices.



6/125. The shopping street.

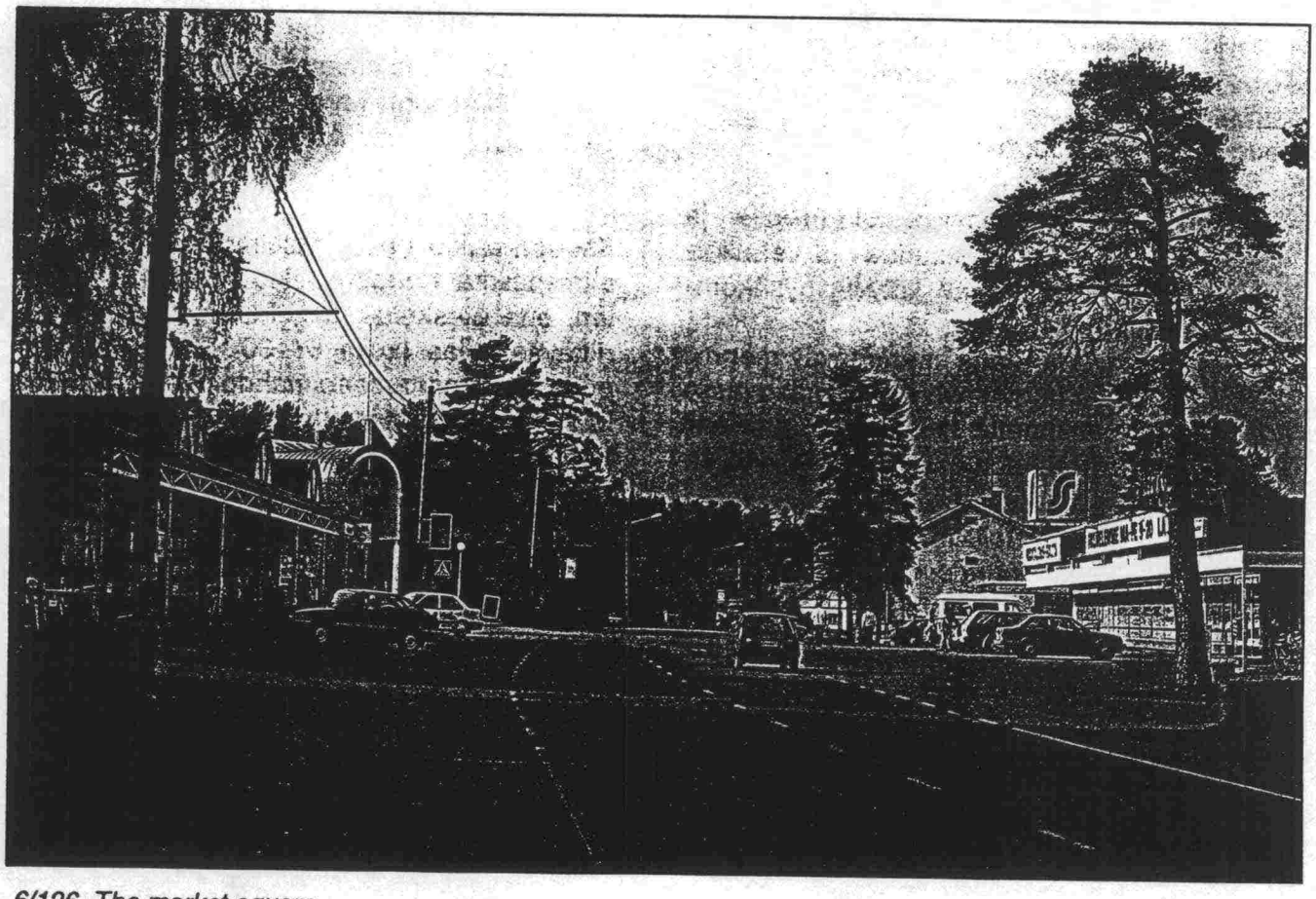
In the shopping street, practically all the buildings along the road have business

premises, and their parking facilities adjoin the road directly.

The shopping street is the busiest section. Most of the traffic comprises local people traveling short distances from one parking place to another. Traffic volumes vary from 2200 vehicles per day on Sunday to 6800 vehicles per day on Saturday. There is also a considerable increase in traffic between 7 and 12 pm on Saturday. The average speed is about 40 kph and the top speed about 60 kph (even during evening cruising).

The bike and pedestrian traffic volume is greatest in the shopping street section. There is a lot of road-crossing in the market place.

There have been four PIF bike and pedestrian traffic accidents on the shopping street section.



6/126. The market square.

Design goals

Approach sections:

- the highway appearance, favoring high speeds, must be changed to reduce speeds (narrower traveled way)
- the road space must be delimited with trees, and existing trees lining the road must be preserved as far as possible
- the status and safety of bike and pedestrian traffic must be improved by reducing vehicle speeds (with the aid of 'gates' at either end of the road) and by constructing a bike and pedestrian traffic path.

Church village highroad:

- the street space must be more precisely defined through new construction
- the old buildings forming the gateways must be preserved; road designs must not require demolition
- long views from the highroad must not be obstructed
- vehicle speeds must be reduced through clear-cut large-scale designs that change driving paths, not small constraints or bollards
- crossing the road on foot or by bicycle must be safeguarded, particularly on school routes.

Shopping street and market place:

- the functional role of the shopping street must be supported with traffic and road design (e.g. parking facilities adjoining the traveled way)
- the pine trees important to the villagescape must be preserved and highlighted
- the thoroughfare must be made to look more like a street; urban features (elevated crosswalks, paving stones, stone-paved areas and bollards) are acceptable
- designs favoring road crossing and reducing vehicle speeds must be given priority.

Design concepts

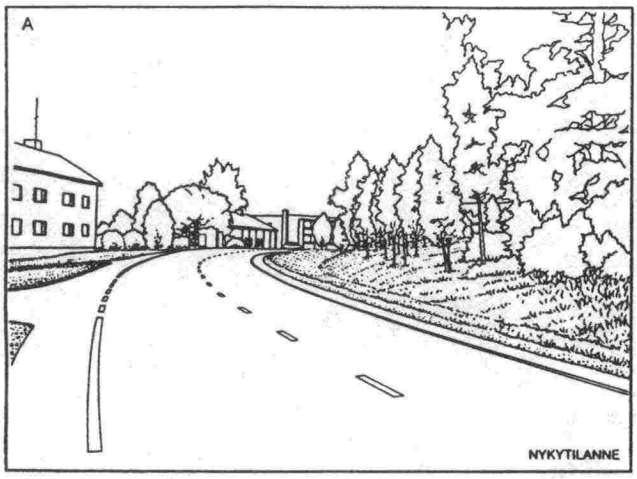
A largish central island will be placed where the approach section changes into the church village highroad, to reduce vehicle speeds and make road crossing easier (Fig. 6/127). An unbroken bike and pedestrian traffic path will lead from the school to the recreation area via the island. An island will enable the road to be fitted into the environment more feasibly, since each lane can have its own vertical alignment.

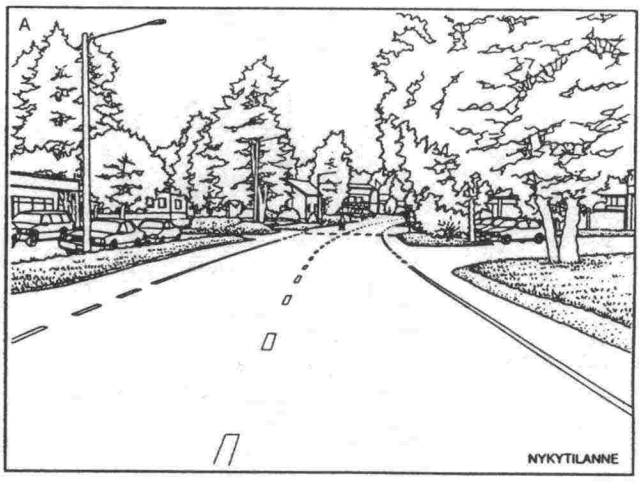
A similar island is proposed for the gateway between the southern approach section and the shopping street.

An island facilitating road crossing is proposed for the church village highroad at the place where an important school route crosses the road, ensuring that vehicle speeds remain low (Fig. 6/129).

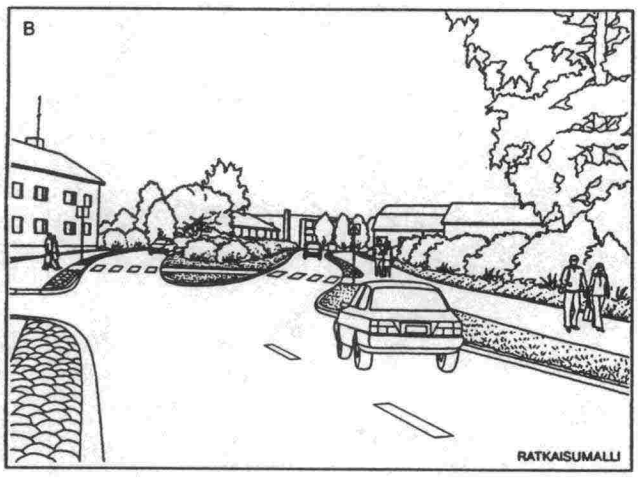
The status of the market place beside the road in the shopping street section will be emphasized by raising the road along the entire length of the place (Fig. 6/131). This will reduce vehicle speeds and facilitate road crossing.

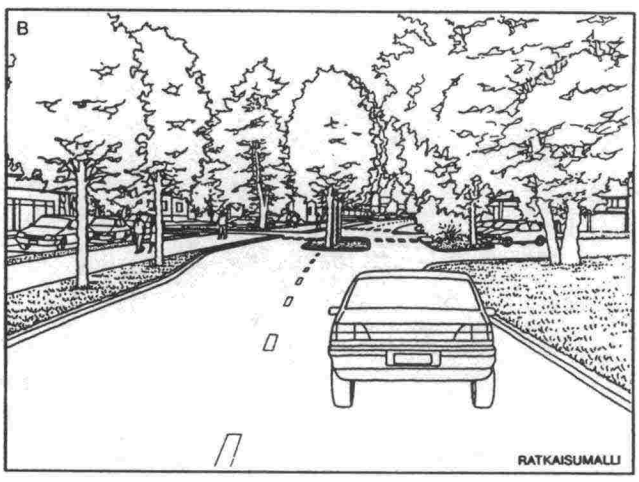
The market place is a meeting place for residents. Sufficient space will be provided for such purposes (Fig. 6/130). The road will be elevated along the entire length of the place to facilitate road crossing. Parking is at an angle adjoining the road, leaving space in front of the stores for pedestrians and ancillary functions such as cafés, stalls, etc.



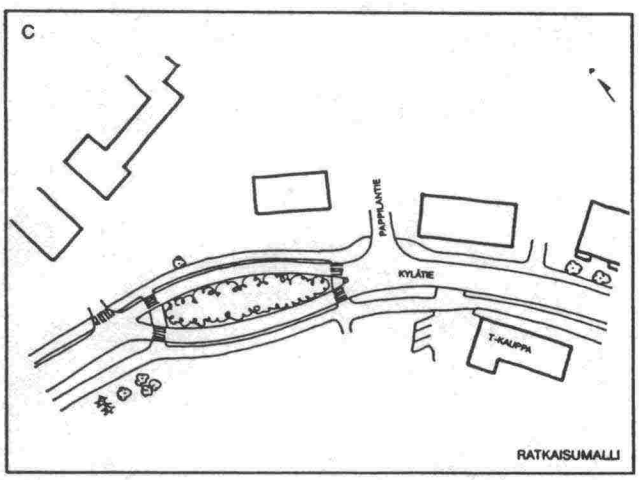


present situation

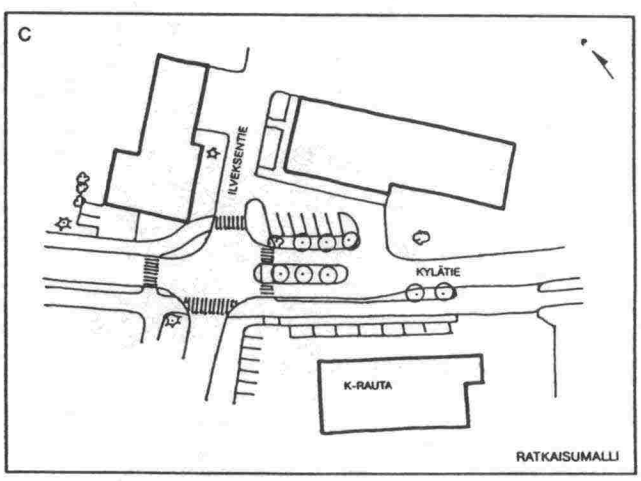




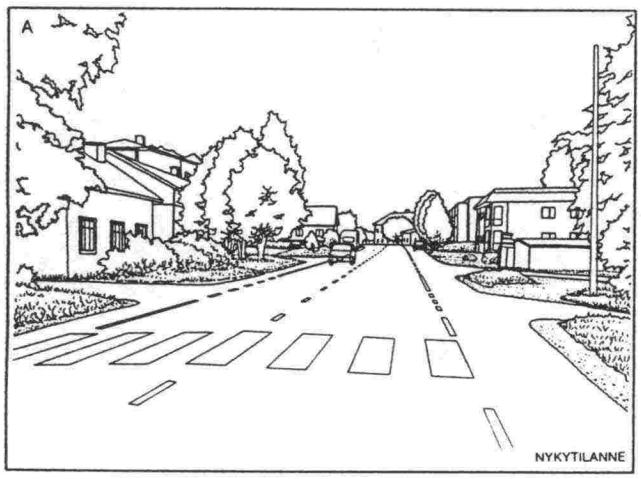
design concept

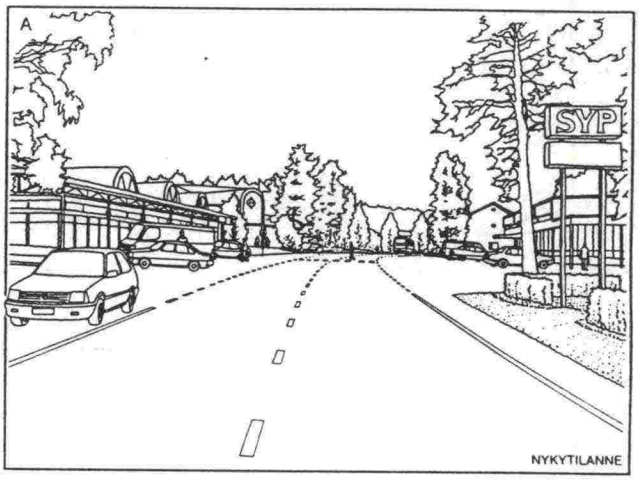


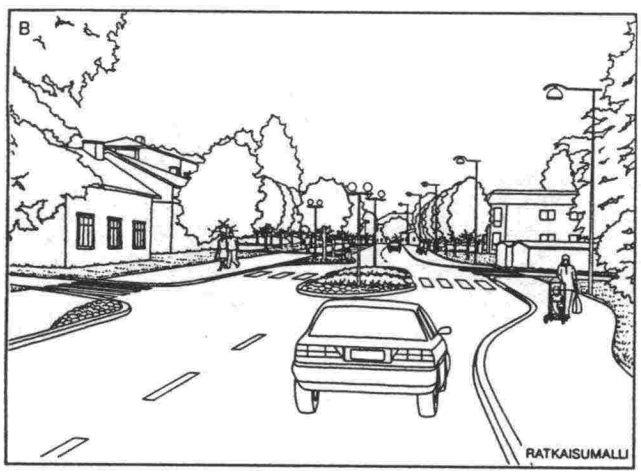
6/127A-C. A constraint at the point where the approach section turns into the church village highroad.

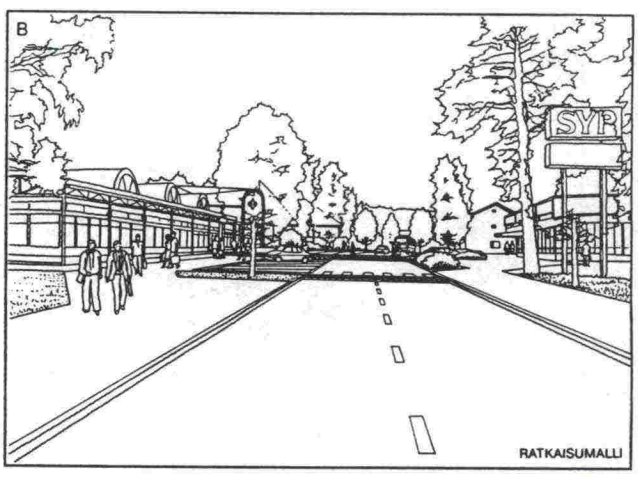


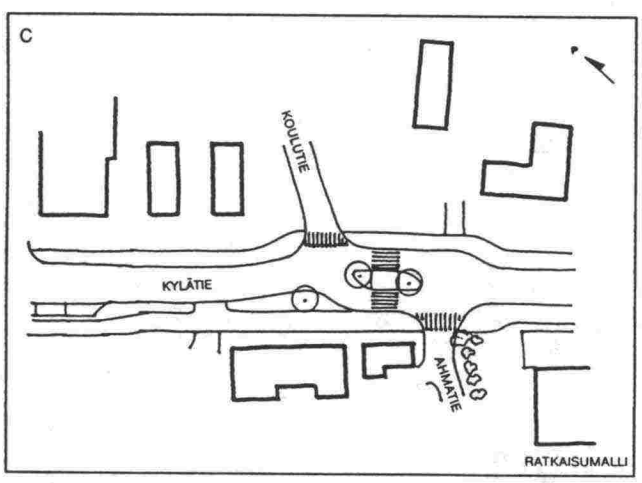
6/128A-C. A constraint at the point where the approach section turns into the shopping street.



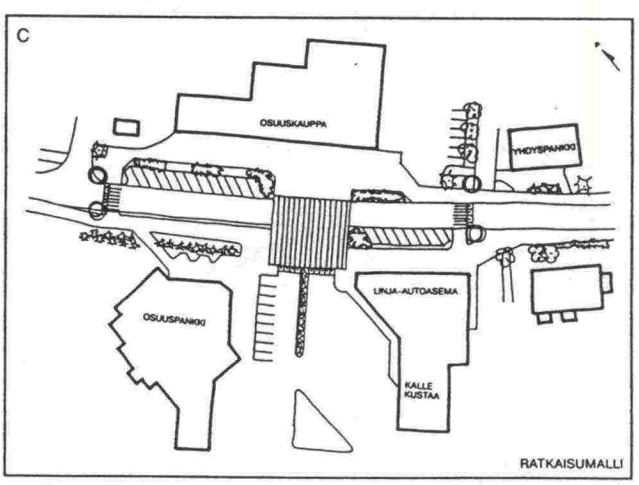




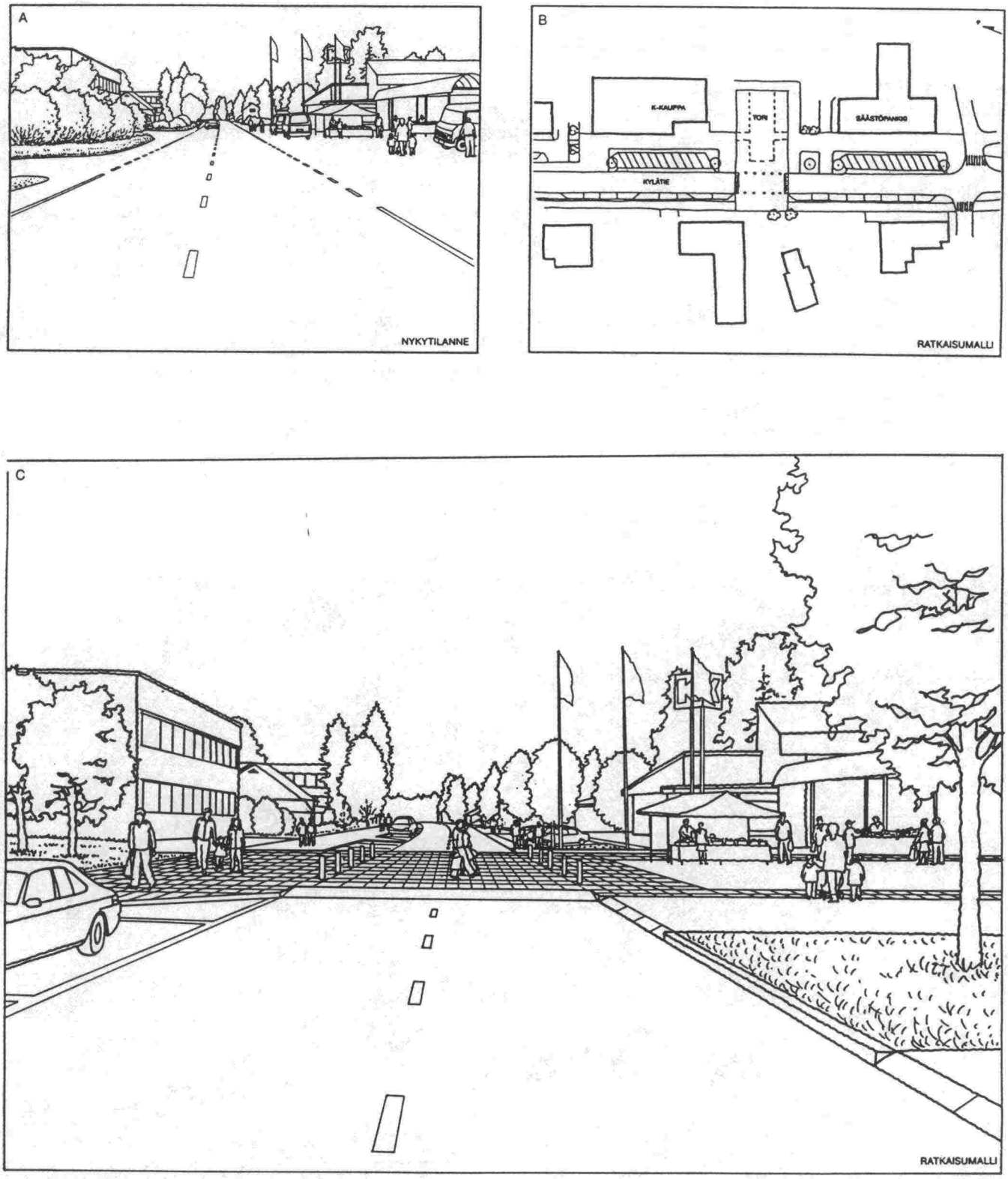




6/129A-C. An island facilitating road crossing in the church village highroad section.



6/130A-C. By raising the entire market square and reserving plenty of space for pedestrians in front of the stores, the significance of the market square as a meeting place is enhanced and crossing the road is made easier.



6/131A-C. The status of the market square has been enhanced by raising and paving the road for the entire width of the square.

6.5.6 Kuhmo

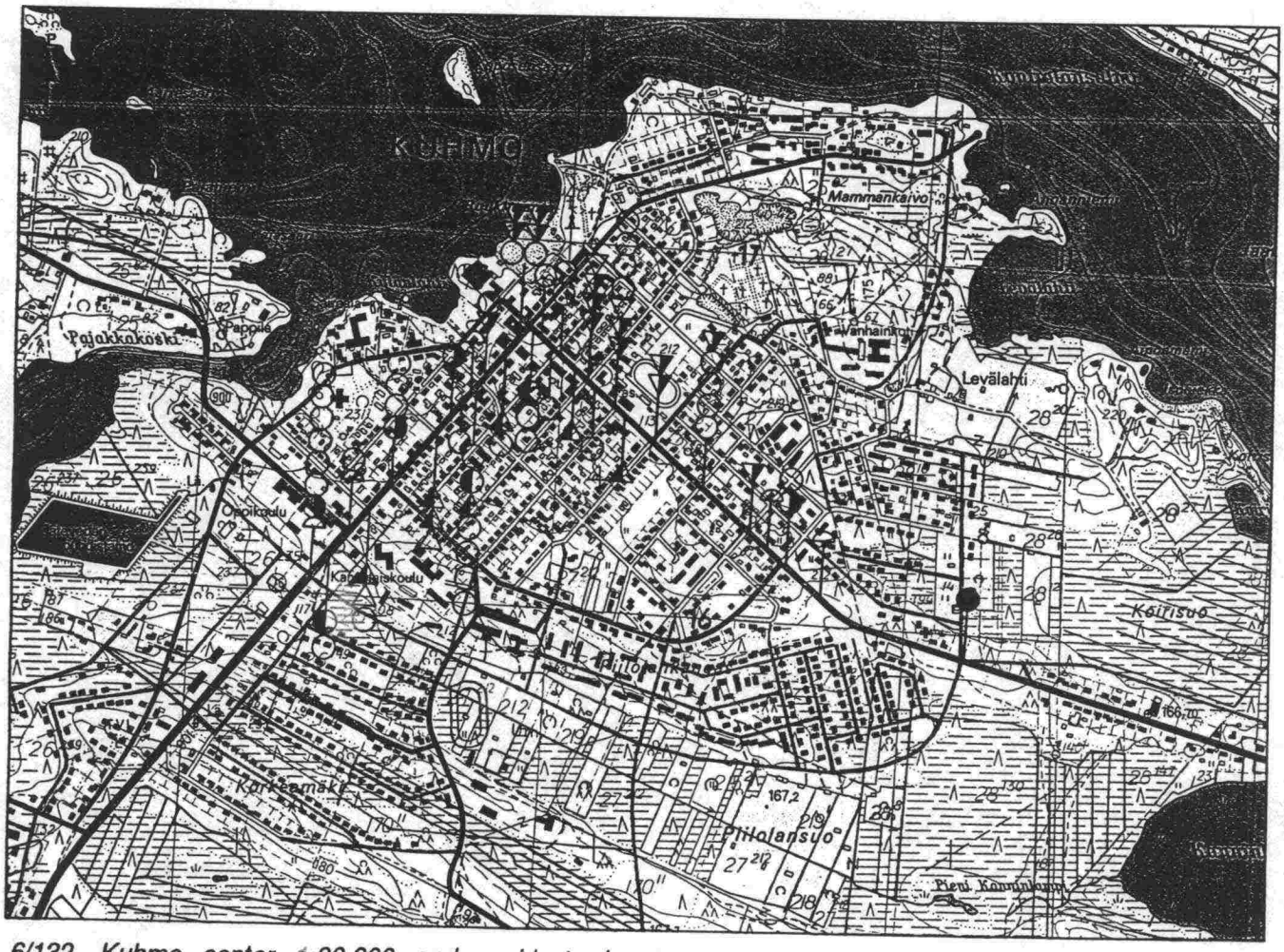
Characteristics of the built-up area

The center of Kuhmo is an urban built-up area, both in structure and in villagescape. The terrain is flat, and only the church is on a slightly higher knoll. The area lies on a lovely lake. Pajakkakoski rapids, flowing from Lake Lammasjärvi, are a particularly striking landscape feature. The watercourses cannot be seen from the main streets in the center.

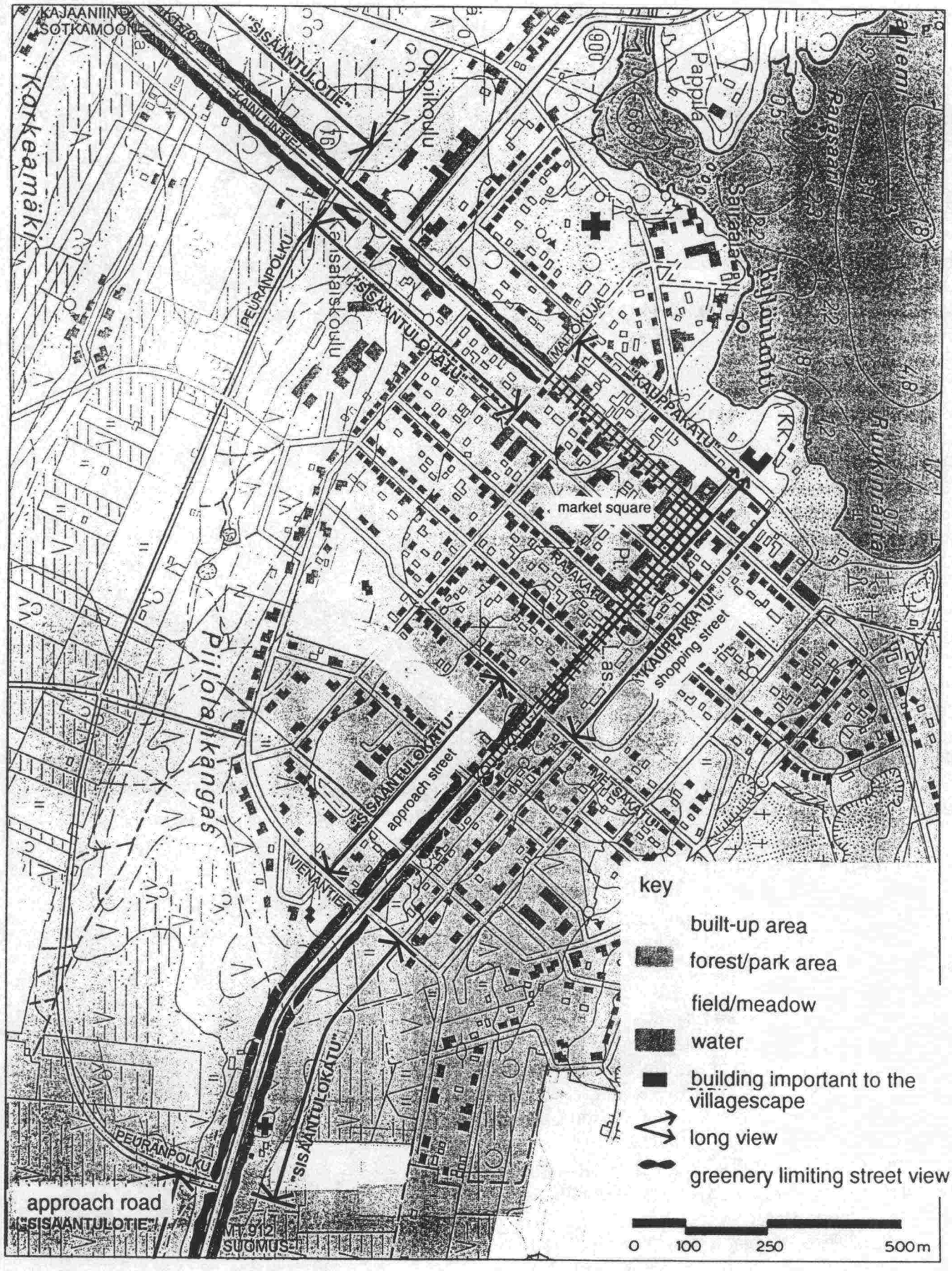
The center has been built according to a grid-plan drawn up in the first approved building plan dating from 1906. The regional road passing through the area also observes the grid, making a 90-degree turn in the middle. This turn has generated a clear focus for the area, with a market square that is very busy in summer.

The buildings along the main street are mainly two-story and three-story housing and business buildings. However, the dominant form of construction is low-rise housing.

The built-up area has expanded greatly over the past fifteen years, and the population of the center was about 8000 in 1992. This growth is visible in the form of new housing estates. The expansion has been controlled, and the new areas adjoin the center. There are no suburbs in the structural sense. The built-up area has relinquished the features of a highroad church village, and now has the characteristics of a typical small town. Thus, it is natural to apply urban design concepts to street development in the center.



6/132. Kuhmo center 1:20.000 and accidents in 1987-91.



6/133. Throughroad segmentation in Kuhmo.

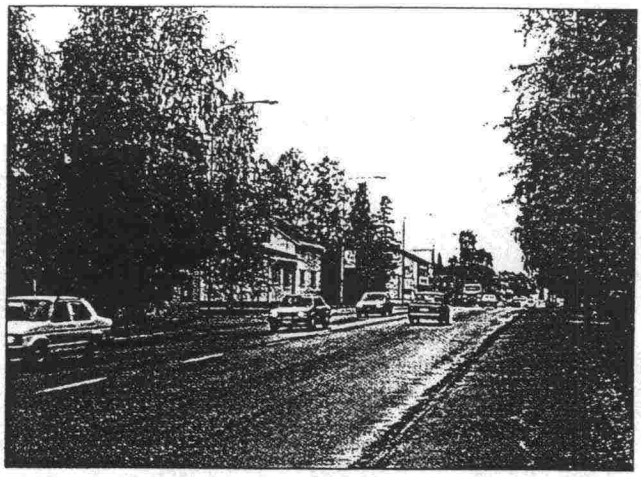
Traffic features

The main thoroughfares of the center of Kuhmo, Kainuuntie and Koulukatu, are public roads: highway 76 from Sotkamo to Kuhmo and highway 912 from Kuhmo to Suomussalmi. In the national road network, the throughroad is classified as a regional road. In the area road network it is a service center thoroughfare.

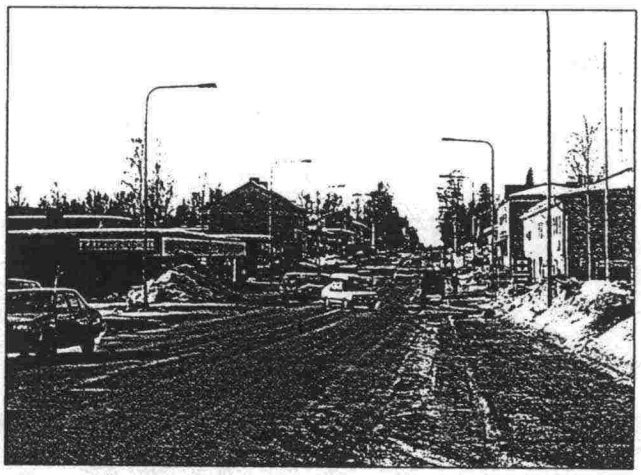
The normal weekday traffic volume is about 3000 - 5000 vehicles per day on the fringes of the center and about 11,000 - 12,000 vehicles per day in the center itself. On Fridays the traffic volume peaks at over 16,000 vehicles per day due to the heavy evening traffic. In summer, the overall traffic volume is greater.

There is congestion in the busiest peak hours on weekdays, visible as slowly moving lines on the main road. There are very few traffic jams. The greatest problem is joining the main road from a side road, since there is a constant flow of traffic on the main road.

Between 1987 and 1991, the police were notified of 76 traffic accidents on the throughroad (from the Kainuuntie/Peuranpolku intersection to the Koulukatu/Peuranpolku intersection); 32 of these were PIF accidents. Bike and pedestrian traffic was involved in 70% of the cases. The next most common category was accidents at crossings (19%).



6/134. The Kainuuntie approach street section.



6/135. The Kainuuntie shopping street section.

Throughroad segmentation

The throughroad segmentation applies to the actual throughroad section, exclusive of the approach roads.

Approach street from Sotkamo

The approach street begins at the Peuranpolku intersection and ends at the Maitokuja intersection. Features typical of this section are:

- the traffic service outlets (four gas stations) are clustered at the beginning of the section
- after these, the land use along the road consists mostly of housing fairly close to the road

6/136. The Koulukatu shopping street section.

- plantings in the yards give an overall impression of greenery
- the road is wide (11 m) and straight
- the traffic volume is about 12,000 vehicles per day
- the average speed is about 45-50 kph and the maximum speed about 70 kph
- many vehicle accidents have occurred at the Kainuuntie/Peuranpolku intersection, but very few of these were PIF accidents
- there is a lot of bike and pedestrian traffic along and across this section, mainly school traffic. There is an underpass for schoolchildren at the Peuranpolku intersection.
- there has been one property damage bike and pedestrian traffic accident in the section.

Shopping street

The shopping street section begins at the Maitokuja intersection and continues past the market square to the Metsäkatu intersection. Features typical of this section are:

- business buildings delimit the road up to the market square
- parking places are in front of the stores, beyond the sidewalk
- the road is wide and straight
- there is no planting along the road
- the market square is the focus of the town
- a handsome old school stands at the end point of Koulukatu
- the street space is considerably broader after the market square; the buildings are further from the road, and there are green strips and parking places between the buildings and the road
- the traffic volume is about 11,000-12,000 vehicles per day
- the average speed is about 35-45 kph, the maximum speed about 50-65 kph
- there is a lot of bike and pedestrian traffic, mainly school and shopping traffic
- there is a lot of bike and pedestrian traffic crossing the road around the market square and the bus depot
- there have been nineteen accidents in the section involving bike and pedestrian traffic; the most dangerous places are along the market square on Kainuuntie and the Koulukatu/Rajakatu intersection.

Approach street from Suomussalmi

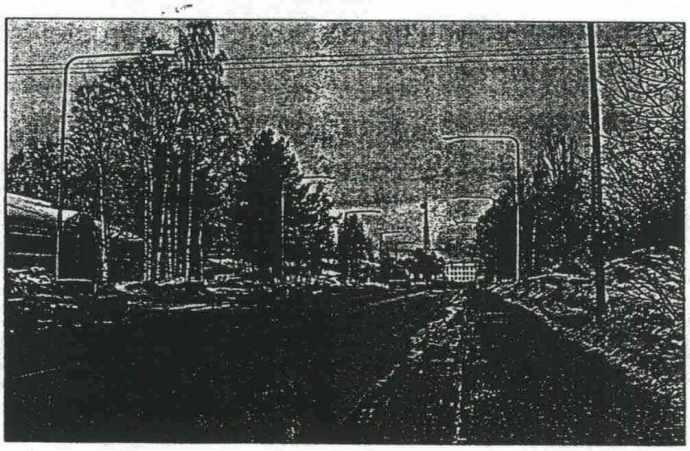
The approach street begins from the Peuranpolku intersection and ends at the Metsäkatu intersection. The section consists of two different subsections:

* Peuranpolku-Vienantie

- the road is highway-like
- houses are pulled back from the road
- there are green zones adjacent to the road
- the traffic volume is about 3,000 vehicles per day
- the average speed is about 55 kph and the maximum speed about 75 kph
- there is very little bike and pedestrian traffic, and that mainly along the road

* Vienantie-Metsäkatu

- the road is streetlike, wide, and straight
- housing plots are directly adjacent to the road
- there are some stores along the road
- planting in the yards make for a green environment
- the traffic volume is about 6,000 vehicles per day
- the average speed is about 50 kph, the maximum speed about 70 kph
- the bike and pedestrian traffic runs mostly along the road, although the few crossing points (the Virkatie and Sepänkatu intersections) are important, as the accident statistics show.



6/137. The Koulukatu approach str. section.

Design goals

Approach street sections:

- vehicle speeds must be reduced at the points where the approach roads become approach streets and kept down for the length of the throughroad
- the status and safety of bike and pedestrian traffic must be improved by providing a bicycle path and facilitating road crossing
- the wide street space should be compressed

Shopping street:

- the status and safety of bike and pedestrian traffic must be improved along the road (by moving parking places away from between the business buildings and the bike and pedestrian traffic lanes) and at crosswalks (islands and traffic lights)
- vehicle speeds must be kept low
- the traffic flow must be paced, for instance with traffic lights

Design concepts

A rotary intersection is planned for the Peuranpolku intersection where the approach road changes into the approach street; this rotary intersection will reduce vehicle speeds and accident risks and make it easier to turn into Kainuuntie. It is also meant to channel through goods traffic to the bypass street.

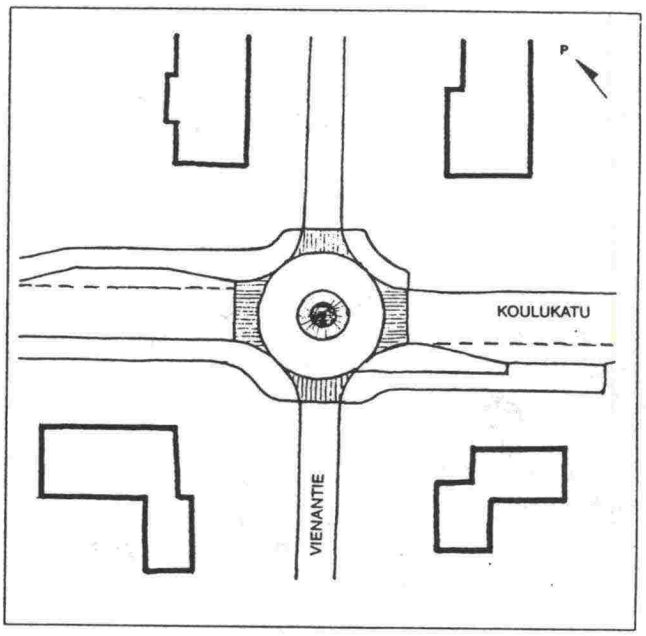
Another rotary intersection could be placed at the other Peuranpolku intersection on Koulukatu on the same grounds.

A mini-rotary intersection could be placed at the boundary of the closely built-up area, at the intersection of Koulukatu and Vienantie (Fig. 6/138), to reduce maximum vehicle speeds.

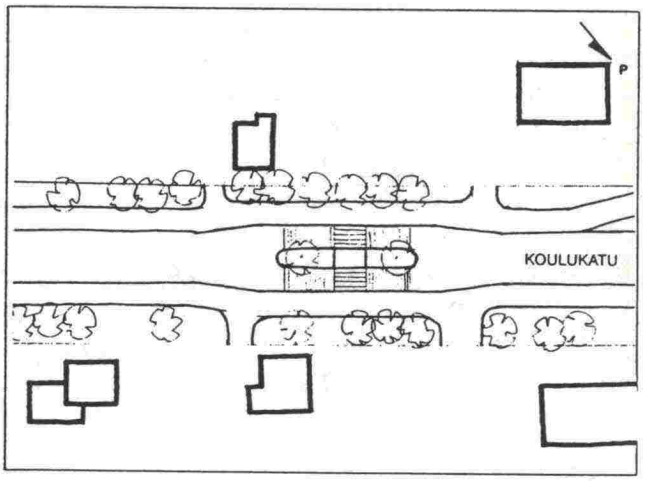
Islands with planting will be placed in the long stretches of street between the intersections on Koulukatu to act as constraints, facilitate road crossing, and interrupt long views (Fig. 6/139).

On Koulukatu close to the bus depot, the Rajakatu intersection could be channeled to reduce vehicle speeds and facilitates road crossing for bike and pedestrian traffic at the bus depot (Fig. 6/141). This intersection can be provided with traffic lights to facilitate turning into the main road and road crossing.

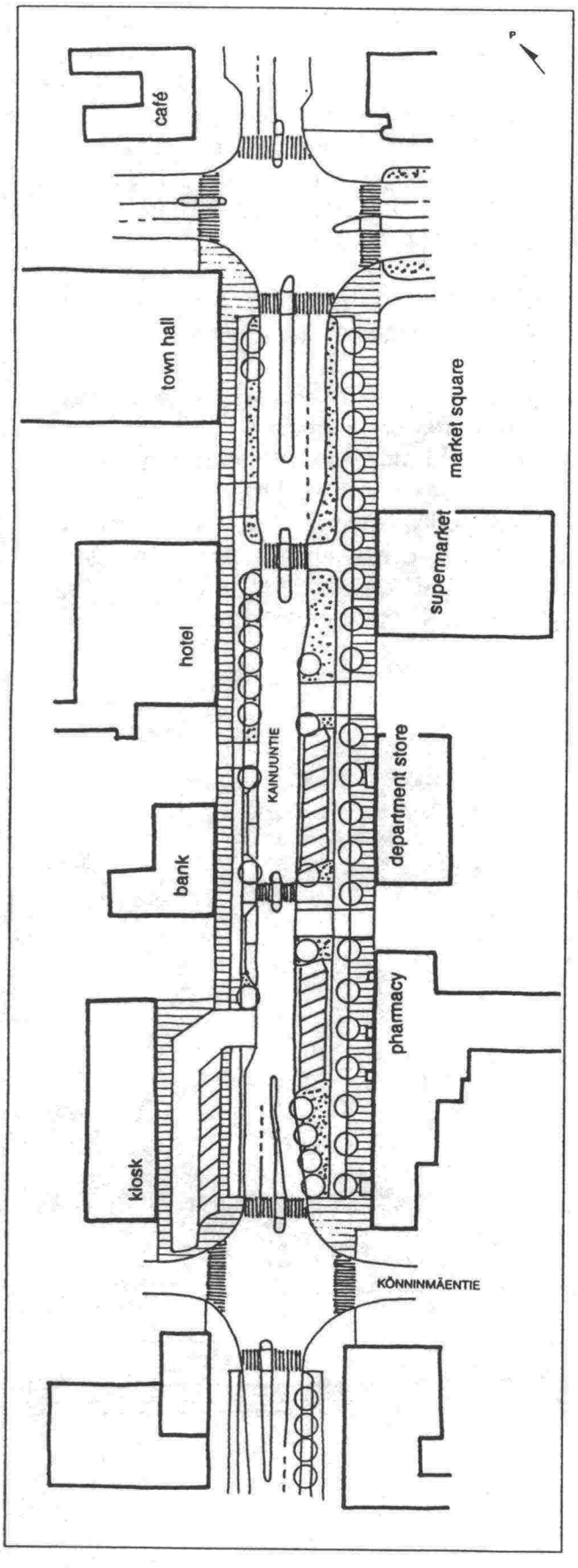
The market square is the most problematic location for bike and pedestrian traffic due to the frequent road-crossing there. A design for coping with this problem is shown in Fig. 6/140.



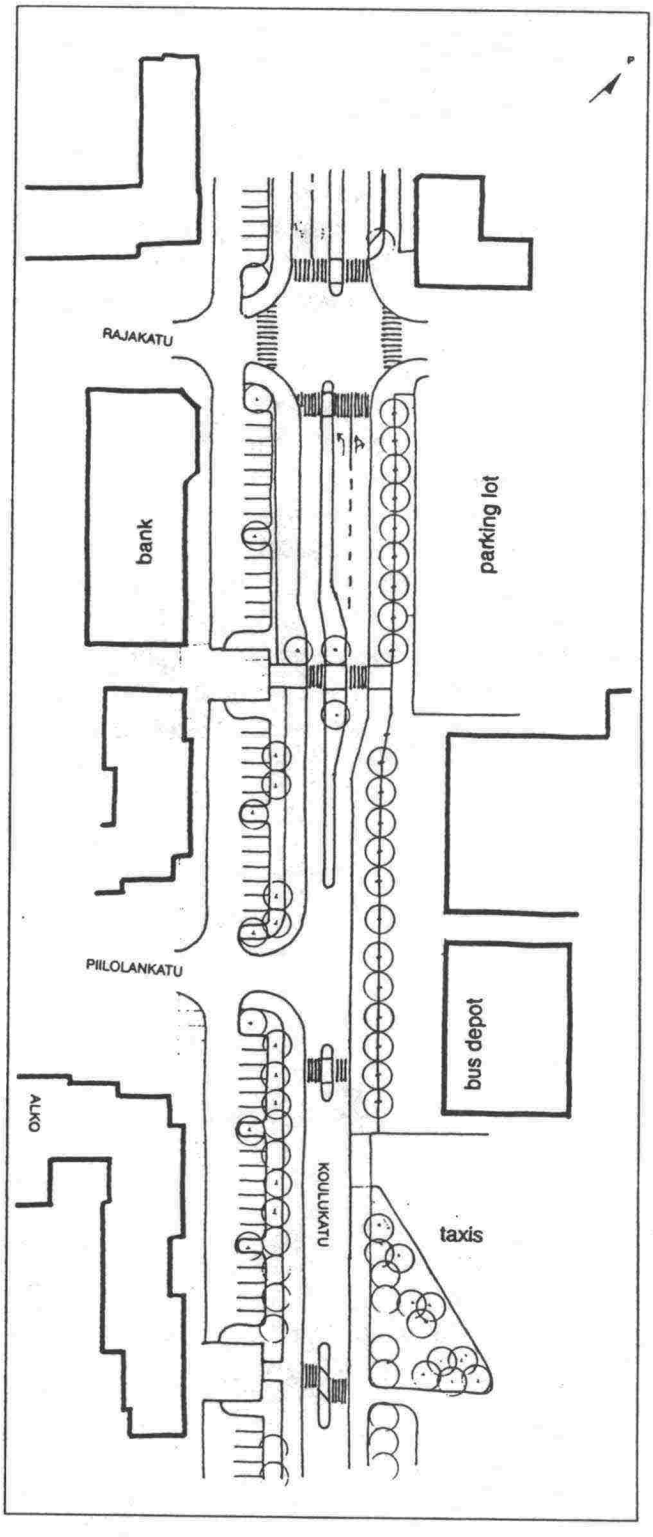
6/138. Mini-rotary intersection in the Koulukatu approach street section.



6/139. A wide central island with planting in the approach street section.



6/140. *Traffic arrangement design for Kainuuntie, improving the status of bike and pedestrian traffic.*

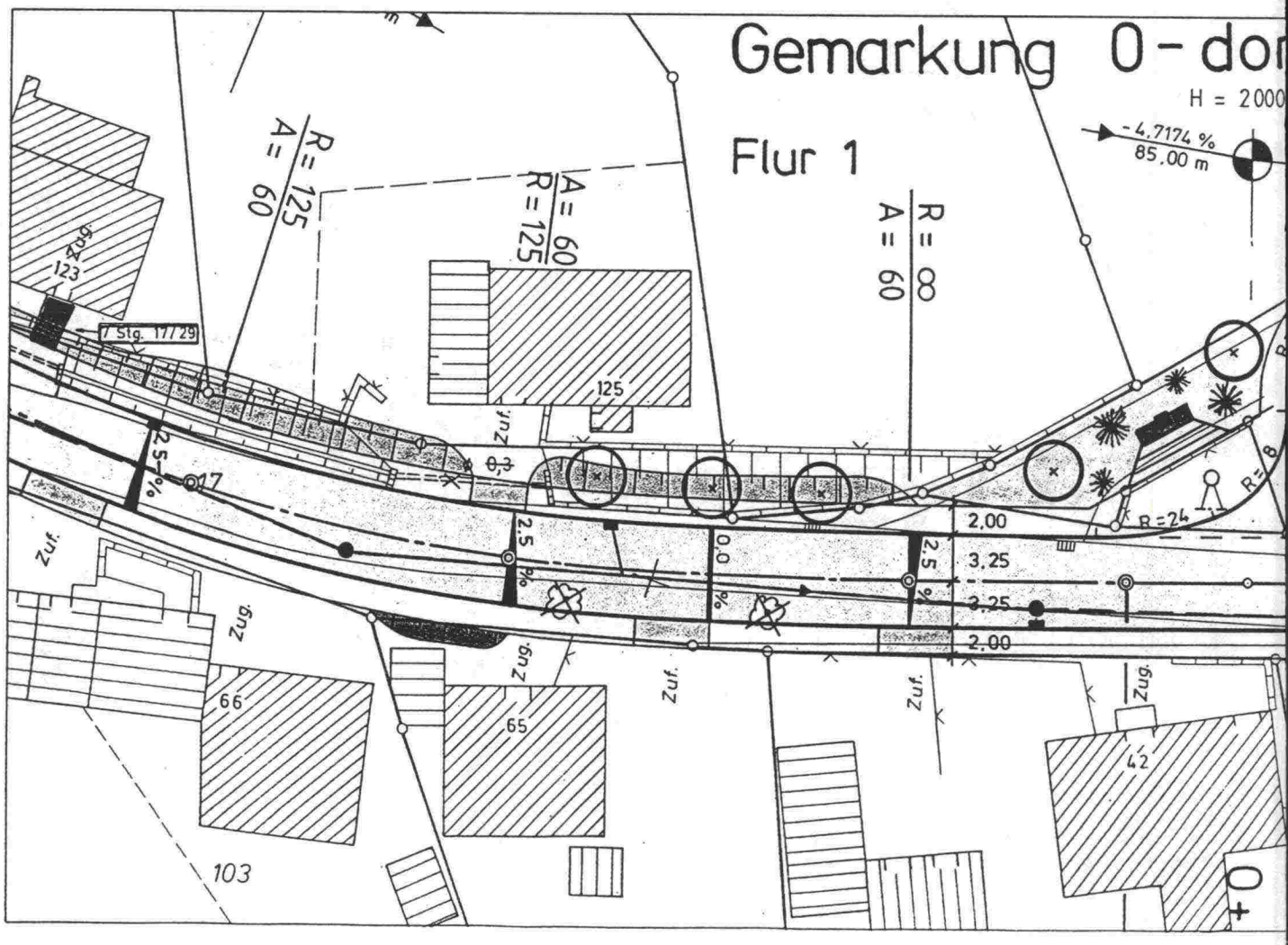


6/141. *Intersection channeling acting as a constraint near the bus depot.*

6.6 Plan presentation

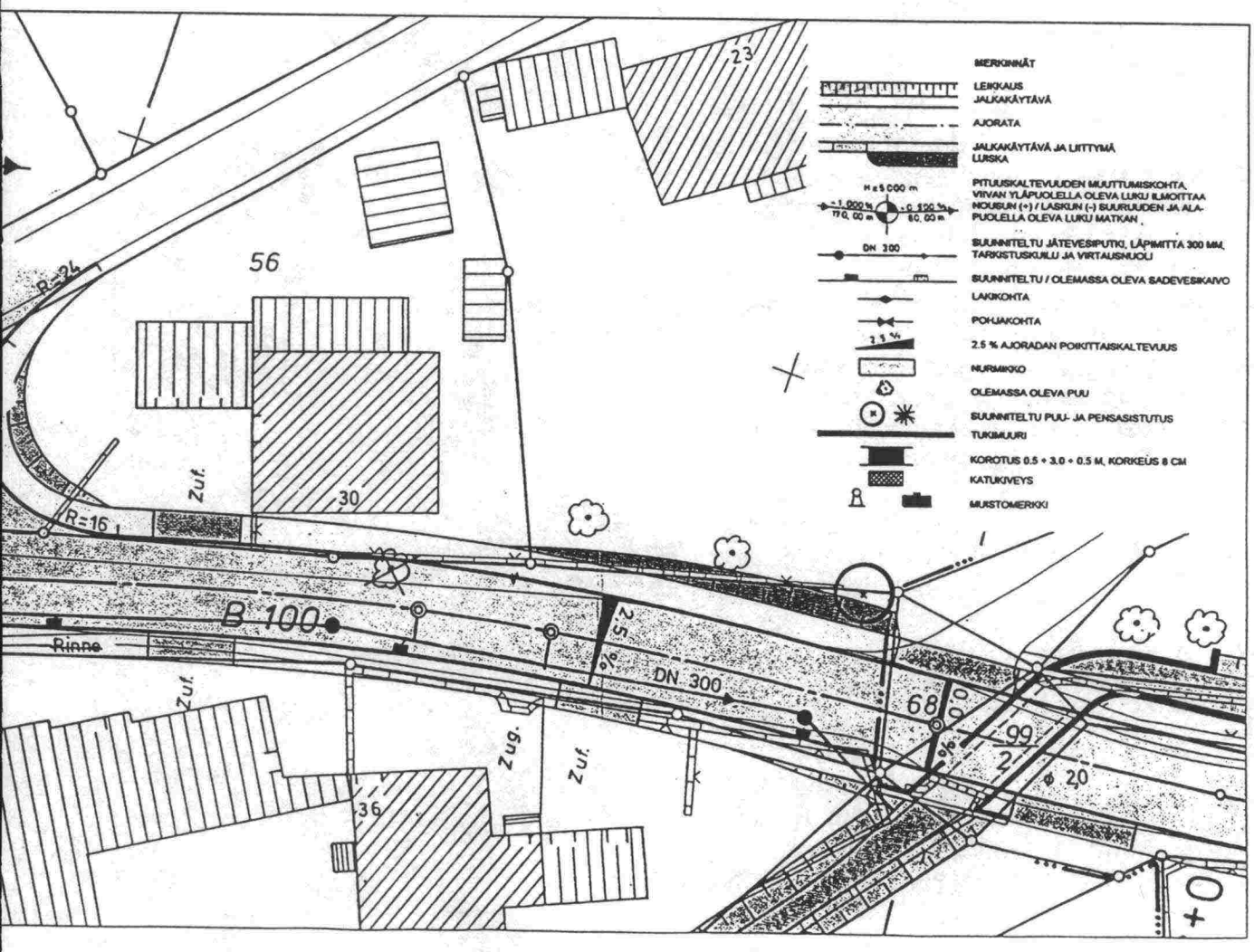
The following points should be observed in reporting on plans:

- the present situation, problems, and development goals from the point of view of the various parties and interest groups
- the effects of measures planned on established problems and shortcomings must be recorded
- the report must contain a general map showing the present situation in the built-up area and the names used
- the plan maps must show all embankments and cuts clearly
- longitudinal sections at the centerline and at either side are required for important locations (sensitive environments, curves, laterally sloping terrain), ensuring that the road is fitted into the terrain
- the plan maps must give sufficient information on road and ground elevation to give an overall idea of the situation without longitudinal sections
- locations where the environment and road arrangements will change significantly must be illustrated from the road user's point of view
- in the case of closely-built shopping streets, it is a good idea to present building elevations in addition to plan maps
- in urban areas, a scale model is a good way of visualizing a plan
- an axonometric drawing should be made at least of the shopping street section
- functionality studies on busy roads should be presented in terms of line lengths and delays, not merely as a service-level code or load figure.



merkinnät	key
leikkaus	cutting
jalkakäytävä	sidewalk
traveled way	traveled way
jalkakäytävä ja liittymä	sidewalk and intersection
luiska	incline
pituuskaltevuuden muuttumiskohta	point where longitudinal slope fall changes
suunniteltu jätevesiputki	planned wastewater pipe
tarkistuskuilu ja virtausnuoli	inspection shaft and direction of flow
suunniteltu/olemassaoleva	planned/existing rainwater
sadekaivo	drain
lakikohta	summit
pohjakohta	trough
2.5% ajoradan poikittaiskaltevuus	2.5% lateral slope fall of traveled way
nurmikko	lawn
olemassa oleva puu	existing tree
suunniteltu puu- ja pensasistutus	planned trees and hedges
tukimuuri	retaining wall
korotus, korkeus 8 cm	hump, height 8 cm
katukiveys	stone paving
muistomerkki	memorial

6/142. An illustrative map of a plan brings out flaws in the design. For example, here the road will have to be banked because there is a slope on one side only. A good plan map also indicates the road and terrain elevations. Source: Richtlinien für die Gestaltung von Einheitlichen Entwurfsunterlagen im Strassenbau, Der Bundesminister für Verkehr, 1985.



7 CONCLUSIONS

A throughroad design successful in terms of both villagescape and traffic safety calls for greater expertise in the planning process than is usually the case in road design, an open process, and new design principles to replace hidebound approaches.

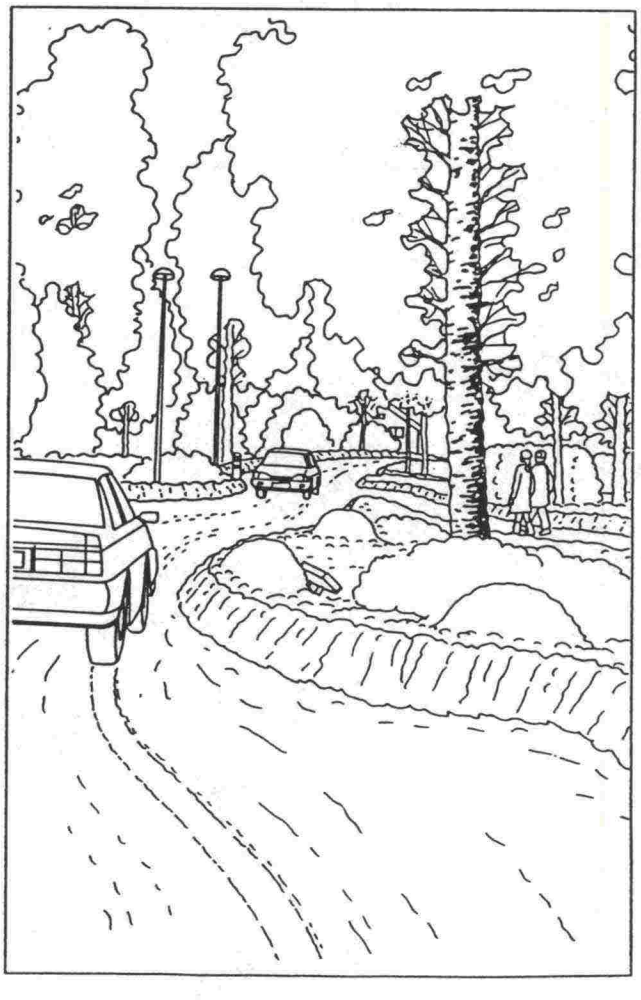
The zoning planner, environmental designer and road designer should prepare the plan in cooperation. Before outlining the design concepts, a present-state analysis must be carried out to establish the real problems and development goals. Interviews with residents, local businessmen and road users provide valuable information for troubleshooting and goalsetting.

If necessary, the master plan and road network plan must be revised, since these define the development principles for the road network and the character of the throughroad; in turn, these are the basis for drawing up the general scheme for the throughroad.

Throughroad segmentation based on the present situation makes it simpler to identify the development needs of each road section and to find solutions that cope with established problems and environmental criteria. Examples of feasible throughroad sections are: shopping street and market square, village highroad, thoroughfare and approach section. An open design process should be used to examine the alternative approaches for each section, i.e. residents, businesses and road users should be involved in appraising the alternatives.

The greatest problem in throughroads is the lack of traffic safety, particularly in the case of bike and pedestrian traffic. The most efficient way to improve traffic safety is to reduce vehicle speeds. A speed limit of 30-40 kph is suitable for the centers of built-up areas.

The main villagescape problems on throughroads have to do with road alignment and particularly vertical alignment. Small-scale, sensitive environments, details, old buildings, structures and trees often disappear or are in



danger of disappearing when road modifications are made.

Because of the low speed limits suitable for throughroads, the road alignment and vertical alignment do not have to observe minimum driving dynamics. The small-scale alignment of existing roads must be preserved, since it supports both traffic safety and the villagescape. Small-scale alignment can be used as a speed constraint to establish a suitable speed level. Overly high elevation can be corrected by using small vertical elements over short sections.

On downtown roads, joining the road, crossing the road safely and parking easily are more important than a continuous flow of traffic on the road itself. Thus, it is a good thing if the traffic flow is interrupted. It is seldom necessary to channel intersections; parking places can be placed adjacent to the traveled way, and there is no need to limit the number of intersections.

Particularly great care should be given to improving the safety of crossing bike and pedestrian traffic. Vehicle speeds must be kept low by scaling all new structures (traveled way, intersections, channelings, etc.) for low speeds and using structural constraints as necessary. Such constraints include islands and channelings designed for low speeds, humps, and throttles. Natural gateways, such as buildings and trees close to the road, should always be exploited.

The safety and comfort of bike and pedestrian traffic along the road can often be improved by removing or reducing the number of parking places between stores and bike and pedestrian traffic routes.

The cost of environment-conscious throughroads varies greatly, depending on the problems and development goals of the area concerned and the measures they require. Preserving a small-scale alignment and a narrow traveled way cuts down on construction costs. Local roads with low traffic volumes can even do without bike and pedestrian traffic paths if they have appropriate constraints. The biggest expense is generated by completely reorganizing an entire street space and bringing the road down to the level required by its surroundings. The management of new greenery and more maintenance work in winter both raise overall maintenance costs.

Maintenance demands must be taken into account in the design process if the result is to be functional. The maintenance work need not require equipment on the FinnRA scale.

When the road builder is involved in the design process and understands the design concepts, and the designer is in turn involved in the construction process, the quality of the end result is guaranteed.

An open design process requires plans to be presented in a very clear and informative form. Plan maps should show the relationship between the elevation of a road and its surroundings. Illustrations and axonometric drawings should be prepared to illustrate the plan.

This kind of throughroad design process is more expensive than the conventional one, since expertise in various fields is required. Open design also increases costs.

Training must be organized for designers, builders, and maintenance personnel. The design directives for throughroads should be supplemented with detailed design principles and models for designing different sections of a throughroad.

Unimplemented throughroad plans should be revised to match the new design principles. Built-up areas that have traffic safety problems should first draw up a plan for minor alterations to reduce vehicle speeds. Old town plans featuring overly wide road areas should also be redrafted.

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Appendix 1

IMPROVEMENT OF SMALL CITY THROUGHROADS

Summary of expert interviews

Problems

- road plans are outdated when they are implemented and may destroy small-scale environments
- a road is unconnected with its surroundings in terms of zoning and structure, i.e. it is highwaylike
- zoning is based on the requirements of motor traffic, the placement of buildings is arbitrary, municipalities do not have their own zoning officials
- links with zoning are weak in small municipalities; FinnRA and the municipality do not have the same goals and do not build in collaboration
- rural BUAs grow slowly and are often encumbered with overly urban plans
- a throughroad is often too inclined to serve land use, i.e. there are too many plot intersections, which in turn erodes safety
- the road environment and villagescape have often been ruined with unsuitable buildings
- rural BUAs have been converted into supermarkets with parking lots
- motor traffic has been the key element, and the environment has been neglected
- the design work often lacks a proper environment survey and environmental impact assessment; the design viewpoint is technical and flat
- road layout design is hidebound
- parking facilities are confusing; large unbroken paved fields are the norm
- a traffic environment that is too good is dangerous since it provokes high speeds and creates the illusion of an easy ride for the motorist
- there are safety problems with intersections; four-leg intersections should be removed
- goods traffic should not be routed through BUAs; dimensioning problems
- delivery traffic is an important component in BUAs, and yet it is poorly allowed for in design, resulting in a lack of space
- mass transit is inefficient, and intermunicipal cooperation does not exist
- bike and pedestrian traffic facilities are deficient, particularly in centers where the traffic is heaviest
- signposting is poor
- throughroads are often designed to accommodate maintenance equipment and thus made too large
- bypasses should be avoided, if only in the interests of tourism; motorists should be made to accept the fact that speed levels are considerably lower in built-up areas
- bypasses attract new construction and kill off the old business districts
- vehicle speeds are too high
- roads levels are too high in relation to their surroundings
- the responsibility for design is not precisely defined
- greenery does not survive

Goals

- to fit the road into the environment and the villagescape, avoid demolition and improve safety
- to develop the existing center
- to improve the villagescape is a municipal duty; the road should change according to its environment
- to reduce speeds and improve safety is important
- walking and bicycling should be seen as a desirable virtue
- it should be simple for even a stranger to move around
- preserving a good environment is a value in itself that will increase the number of travelers and shoppers
- it is important for stores to be visible from the traveled way

Good design principles

- a villagescape analysis should always be performed to serve as a basis for planning; municipality-specific building inventories are already being introduced
- the history of the area must be remembered when plans are drafted
- it is important for the road network and land use to be planned simultaneously
- the planning process must take into account the entire space between buildings, fit the vertical alignment of the road to the environment, and establish the correct scale
- road layout design must be incorporated into zoning; it should be presented and discussed together with the zoning plan
- a bypass is not automatically a good solution for the environment and the villagescape; noise levels must also be considered
- a bypass is usually safer than a thoroughfare through a BUA
- since a straight road raises vehicle speeds, traffic must be moderated with structural features
- travel speeds must be reduced in centers, although the stretches with low speed limits should be fairly short
- travel speeds should be reduced with structural features (humps, throttles, curves)
- a suitable speed level for motor traffic should be determined (in most cases 40 kph is appropriate)
- a throughroad with curves reduces speeds
- reduced speeds make maintenance easier
- journey time equals trafficability; journey times increase negligibly if speed limits are imposed
- the road cross-section must not be too narrow or goods traffic will cause safety risks
- intersections must be extensive enough
- even a slow speed is preferable to a STOP sign for goods traffic in centers
- the needs of service traffic must be established at the zoning level
- the volume of service traffic is decreasing, since there is a tendency to pool deliveries; on the other hand, this means larger vehicles
- rural bus traffic should not be allowed to die; it should be pondered whether mass transit or road construction is more important
- curbside parking is possible in areas with low speed limits
- no roadside parking
- parking places could be placed between buildings instead of in front of them
- BUAs should not be designed for private cars alone; the environment benefits from designs favoring bike and pedestrian traffic and mass transit
- the focus should be on how people will move in the future, not on old routines

- instead of freedom of movement, the keyword should be minimizing movement; BUA centers must be condensed
- if the villagescape is consolidated, parking facilities must also be condensed
- aesthetic quality and traffic safety go hand in hand
- children must be considered
- bike and pedestrian traffic must be emphasized and segregated from motor traffic
- no separate paths for pedestrians and bicylists, no bicycling in the traveled way; bicycling is an important way of getting around in BUAs
- separate paths for bicylists
- building more bike and pedestrian traffic paths will increase the number of accidents on them
- enough crosswalks should be provided at appropriate places
- maintenance services can be bought; roads do not have to be designed to accommodate FinnRA equipment
- use of greenery and the right kind and size of plants; not the same plants in all parts of Finland; the use of existing vegetation must be considered
- snow dumping areas should be designated to avoid great snow loads in areas with planting
- the design process should be open and unprejudiced

Planning approaches

- the planning process must be open and interactive from the very beginning; normally property owners do not require changes until the implementation stage, since it is then that the space requirements can actually be seen. This is why it is important to explain plans to the public at the preliminary design stage; the designer has a vision of the BUA in the future, but everyone else assesses the situation here and now
- it is impossible to overestimate the level of expertise required from the designer
- direct hearings should be organized; greater democracy takes time and increases costs, which should be allowed for
- preliminary plans should be regularly on display, and any replies to queries and comments should be made before road layout design begins
- all citizens should have the right to object to the final road plans (legal appeal)
- road plans should be included in municipal zoning reviews
- the knowledge and expertise of residents' associations should be used; the designer must keep a level head in the crossfire between several interest groups
- cooperation between the various parties must be emphasized in training
- throughroad design should usually be the concern of the zoning planner
- architects should be consulted as experts in the building tradition
- both the environmental analysis and the design work for new environmental features should be done on site as a three-dimensional process
- planning on site is essential
- flexibility, avoiding normative design, should be emphasized
- businesses, delivery, and taxi drivers, etc. should be involved in the design work at an early stage
- the Finnish National Road Administration should have separate groups for throughroad design, since this type of planning calls for specialization
- there is a conflict between the powers that be and the residents; the decision-makers are car-driving men in their forties, while most of the residents use different means of transport; municipal decision-making does not represent the ordinary citizen

Implementation

- temporary arrangements during the roadworks must be carefully planned
- residents must be informed about the work so that they know how to organize their lives accordingly
- municipalities should be required to carry out related work at the same time as the road construction
- environmental improvement work should be done first and not last, as is usually the case
- designers and builders should have the right attitude and qualifications for the work
- the absence of the designer from the worksite is usually because the road builders do not want yet another supervisor; sometimes the builder hires the designer as a supervisor in his own organization
- construction may be hyper-efficient, removing too many trees for good measure so that the rest of the work does not have to be too exact. Even a good plan does not necessarily materialize as the designer meant it.
- there are often clumsy details with a major impact on the execution
- if the plans are deviated from during the work, the designer should always be consulted
- improving store fronts as part of construction requires good cooperation in planning and presenting the design concepts in an understandable form ("a good environment brings more customers")
- maintenance crews should be instructed about quality and hygiene in a small-scale environment
- the construction work should be faster
- the present distribution of road funding leads municipalities to accept unnecessary road projects to obtain State subsidies and jobs; funding for such projects should be channeled directly to the municipalities, which would then have a greater share in and say over road projects; however, the public interest must be supervised by the State

Appendix 2

FinnRA/Strategic Planning
Saara Toivonen

MEMO

November 16, 1992

ENVIRONMENT-ORIENTED THROUGHROAD DEVELOPMENT
Main points arising at the expert seminar organized on September 17, 1992

This memo is a summary of the opinions voiced by interest groups at the seminar.

Links between road design and zoning

- Cooperation between zoning and road design should be improved. A better integration of traffic and land use would improve the end result and cut costs. Zoning is the only means for keeping the villagescape together.
- Zoning plans are not up to date with regard to the new goals of road design.

Right of appeal

- The right of citizens to appeal in road design matters should be extended to match the right of appeal in zoning questions.

The problems and design goals in BUA traffic

- The real problems should be established separately for each site. The design goals should also be established through discussion. This would produce site-specific design concepts which in turn would save both the environment and money.

The development of trade and its effect on BUA traffic

- The prognoses for the trade sector show that the present trends will grow at an increasing rate:
  - store sizes will grow
  - commercial services in small centers will continue to wilt, making it necessary to obtain services over a larger area
  - there is a feeling that business environments should be pleasant the year around, i.e. more shopping malls will be built
  - investment opportunities in rural BUAs will decrease; renovative construction will become important
- The concentration of trade in increasingly larger units is worrying, since this results in a less dense service network, forcing more people to use cars. Higher traffic volumes lead to an increasing number of accidents.
- Putting trade in the same position as industry (i.e. the municipality would provide the premises) would improve its status.
- Design concepts accommodating summer peak traffic should be developed to the satisfaction of all involved parties; this might involve a more comprehensive zoning approach.

Delivery traffic

- Combining traffic design and delivery traffic arrangements still needs work by the trade sector, zoning officials and road authorities in cooperation.
- The large size of delivery traffic units causes problems in BUA planning, especially in old small-scale centers.

Villagescape

- Nearly every BUA suffers because the vertical alignment of the throughroad has been elevated. Lowering the road is often expensive. Buildings from different periods can be of varying height, making it difficult to find an appropriate solution.
- A village environment is often spoiled by demolishing old buildings or felling old trees - for instance, for snow space.
- Disregarding the style of existing buildings in building design undermines the villagescape.
- The traditional road alignment is often the most characteristic element in the villagescape and should be retained if at all possible.
- Traffic signs are used too much as it is; signs may be erected, for instance, in places where parking is prohibited in any case by the Road Traffic Act. Structural features are better means of correcting traffic behavior.
- Administrative potential for creating good BUA design should be examined. The division of costs in different alternatives for parking facilities should also be examined.
- The environment is also included in the goals of the Finnish National Road Administration. In practice, it has proved difficult to obtain funding for environmental improvements.

Speeds and their effects

- The probability of pedestrian death rises sharply with vehicle impact speeds of over 40 kph.
- Technical features help justify a low speed limit and make it easy to observe.
- Traffic speed moderation should be done through structural means in BUAs. However, municipalities often cannot afford to build traffic constraints. Furthermore, most bike and pedestrian traffic accidents occur in large BUAs, where speed humps cause difficulty for mass transit vehicles (e.g. articulated buses).
- Not all problems can be solved through structural means. Credible vehicle speed monitoring is also necessary.
- Traffic signals decrease road capacity; constraints do not. Humps are difficult for goods traffic, but careful design and accurate implementation make things easier.
- A lower speed level in centers should reduce exhaust emission levels somewhat.

Traffic flow

- Comfort is more important in shopping streets than high speed.
- When discussing traffic flow, other forms of traffic besides motor traffic should be considered.
- The smooth functioning of intersections is important for stores.

Class I highway standard in BUA centers

- In Lapland, all church villages have a class I or class II highway running through them. Such villages exist in the south, too. The standard of main roads in BUAs and acceptable design concepts for them should be established. There may not be all that much through traffic, so building a bypass would be an exaggerated solution. In many cases, the best approach is to

implement measures to improve safety and preserve the environment, leaving the road in its present place; only after this proves insufficient would a bypass be built.

Noise

- The noise problem on thoroughfares in a BUA is not an easy one to solve. Wall and window design does not remove yard noise. Noise barriers are not appropriate in the villagescape, but on the other hand they may help to preserve it: the center may retain its present position if a new bypass is segregated from it with noise barriers.
- If noise is combated by relocating functions, parts of the BUA structure are left for second-rate uses or to be demolished. The change may take a while, leaving the noise problem of existing functions unsolved.
- Reducing speeds can reduce noise problems, so the acceptable speed levels in each project should be re-examined.

Bike and pedestrian traffic arrangements

- It would be advantageous for bike and pedestrian traffic if the number of side road intersections were reduced; however, service traffic may sometimes call for even two access routes per plot. Design concepts minimizing the conflict between bike and pedestrian traffic and service traffic should be developed.
- Road crossings for bike and pedestrian traffic should be safeguarded with structural features (throttles and elevated crosswalks, for instance).
- The design details of bicycle path extensions (crosswalks over side streets) should be further developed.
- Curbside parking may be a safety risk in areas with children.

Bus stop arrangements

- Bus stop design options in downtown areas should be considered. A bus stop directly adjoining the traveled way does not significantly disturb the traffic flow; moreover, it acts as a constraint.
- Careful and small-scale design of the environment is significant for disabled people moving alone: curbstones are important for perceiving divisions in the environment, while a platform is important for elderly people when boarding a bus.

Maintenance/special sites

- The design work should aim at an end result that is feasibly maintainable. Maintenance services can be bought from the municipality or a private company; a throughroad need not be designed to accommodate the FinnRA. Some environment-oriented designs concepts increase the price of maintenance in any case (e.g. those involving snow removal).

Feedback from projects in practice

- As part of preliminary planning of the throughroad in Ylistaro, all households were sent a questionnaire on the acceptability of environment-oriented design goals. Most of those who answered are in favor of these goals.

SUMMARY BY THE CHAIRMAN

- There is wide support for new ideas in BUA throughroad planning.
- Existing road plans may need revising because of this.
- The fragmentation of the BUA structure and recent trends in new business premises are worrying
- The vertical alignments of roads and parking facilities require attention.
- Environment-oriented designs are not detrimental to motor traffic, since it will be easier to merge into the throughroad and curbside parking can be increased once travel speeds on the throughroad are lowered.
- The 40 kph speed limit met with no opposition, perhaps because the BUAs that are being contemplated are not very big.
- The design process must be diversified: the zoning planner, road designer, the business sector and residents are needed in the design work.
- It is interesting to see how participation will be encoded in the new Road Act.
- When projects designed in line with new ideas are implemented, follow-up is required to develop these ideas further.

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